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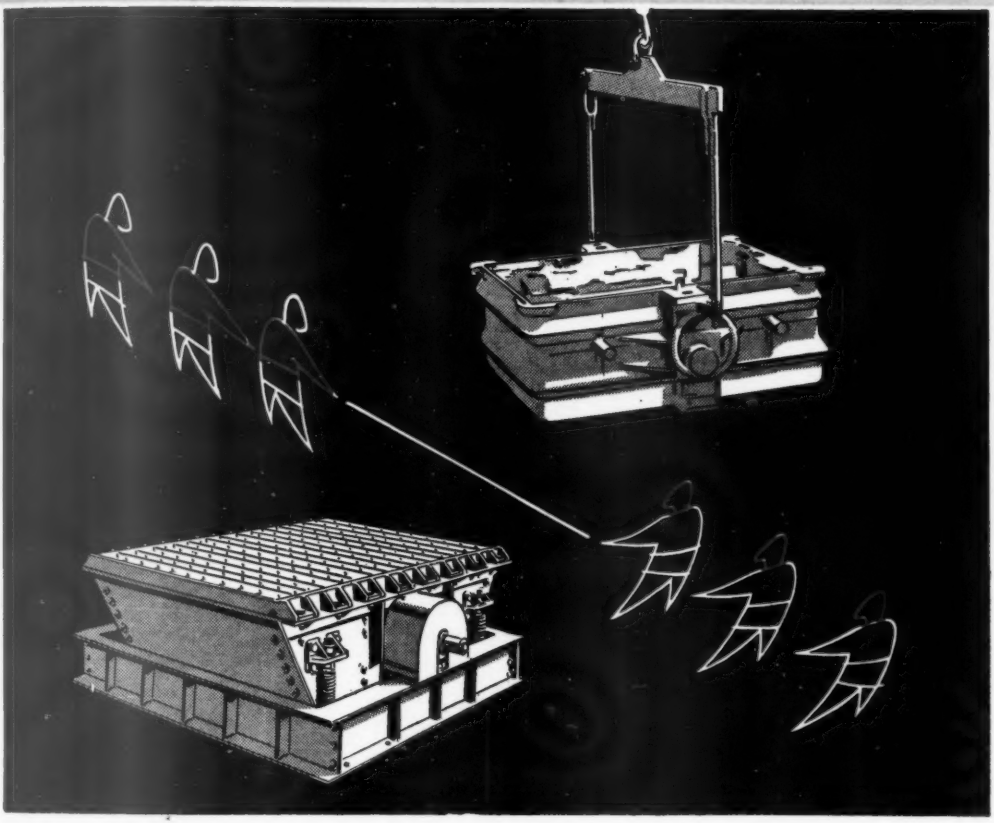

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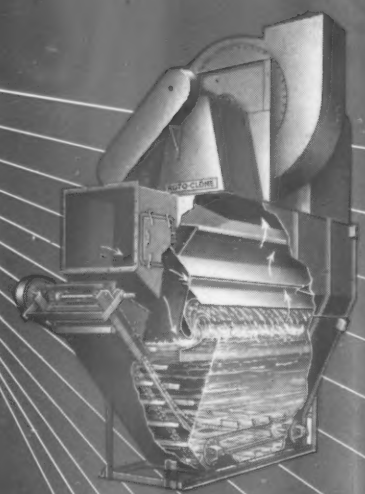

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Established 1902

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Printed Sales Conditions

Recently, *The Times* correspondence column has been used for the ventilation of readers' views on the printed conditions under which a firm conducts its business. The first letter, if we remember correctly, only objected to the smallness of the type used. We do not find those which come into our hands difficult to decipher, but do object to seeing them printed on the back of ordinary letters as we deem their proper place is on quotation forms. Where an industry has unified its conditions of business, the customers have only to read them once to assess their import on the business transacted. They should not leave it until dissatisfaction arises to ascertain the position. There is a distinct advantage to be had where industries unify their conditions of business, as the pernickety buyer knows just where to look for the clause to which he might take objection and he can then negotiate for amendments.

Before the various foundry associations standardized their selling conditions, we were constantly being approached to enunciate exactly what was the "custom of the trade." Quite often these queries related to the replacement of defective castings, and sometimes included claims for consequential damage. On the latter question, we were always quite definite in our opinion that such claims should not be entertained, but on such matters as to what period of time could be allowed before notifying a defect, we had to "hedge" by saying the custom of the trade varied from district to district. From this point of view, the issue of unified conditions of sale has been a boon, as at least there is something set down in black and white, whereas evidence had to be assembled, usually at high cost, to ascertain just what was the custom of the trade.

There has been a hint that the issue of unified selling conditions may contravene the new laws covering restrictive practices. From those we have seen, such an idea is sheer nonsense, as there is nothing restrictive about telling a potential customer of the conditions attached to any order he may place, especially as the clauses can be, and are, modified in individual cases. The section which is most frequently contested is that covering the time for the notification of defective workmanship, and it is obvious that conditions may arise when an extension of the stipulated period can be granted. Obviously, the agreed conditions are suitable for 90 per cent. or more of the business done by founders. By and large, we feel that the use of unified conditions by an industry—even though they be printed in small type—is appreciated by the customers. Moreover, as use is made of stereotyped plate, there is no chance of a printer's error creeping in to alter a meaning.

Death of J. H. Küster

Mr. J. H. Küster, past-president and honorary president of the *Verein Deutscher Giessereifachleute* the German Ironfoundrymen's Association, died suddenly on March 20 at the age of 75. Born at Cologne in 1881, for over 50 years his life and activities were closely connected with foundrywork. After four year's practical training he went to the Engineering College at Cologne, which he left in 1902, starting work in the drawing office of the former Deutz Gas Engine Works and after two years transferring to the firm's foundry. From 1909 until 1919 he was foundry manager of the iron, steel and metal foundries of the Blohm & Voss shipyard at Hamburg, returning in 1919 to Cologne as foundry manager and remaining until 1951 as foundry director of the amalgamated works of Klöckner-Humboldt-Deutz A.G. He gained much valuable experience from visits to the US in 1924 and 1937 which subsequently benefited not only his works but also all German foundrymen. He joined the *Verein Deutscher Giessereifachleute* as a member in 1924, and, was chairman of the previous Rhineland-Westphalia branch from 1939 to 1945 becoming national president of the VDG in 1945. In this capacity, working under the difficult circumstances imposed by the post-war years, he achieved the rebirth of the VDG. He was made an honorary member of the University Aachen in 1948.

When Mr. Küster handed over his office after ten years as national president to Dr. Ing. Schwietzke in 1955, he was unanimously elected honorary president. A year later the Association awarded him its highest mark of distinction, the "Ledebur-Memorial Medal," and on his 75th birthday he was awarded by the German Federal President with the "Meritorious Service Cross, first class,"; he received this decoration from the head of the Cologne Government. Members of the Institute of British Foundrymen who met Mr. Küster at the International Foundry Congresses in London 1955 and in Düsseldorf 1956 will long remember his kind personality.

Noise Nuisance—Powers Sought*

According to a report by the law committee of the Association of Municipal Corporations, it is the intention of the Minister of Housing and Local Government, that a clause classifying "unnecessary, unreasonable and excessive noise" as a "statutory nuisance" shall be included in a forthcoming Bill; the question of extending it to cover vibration is being considered. One of the main difficulties is likely to be in interpreting what is meant by "unreasonable, unnecessary, and excessive," but local authority legal experts say much will depend on the circumstances and the nature of the complaint. Recent surveys had shown that most complaints were about circular saws, industrial machinery, hammering, hooters, steam emission, starting of gas-fired boilers, running of engines and shouting and singing at trade premises. If noise is made a statutory nuisance, it is proposed that penalties of up to £5 should be imposed for not obeying an abatement order. As at present worded, the proposed clause would give a trader the defence that he has used the best practicable means for preventing or mitigating the nuisance. It would also be necessary for a complainant to get the support of no fewer than two other occupiers of property within the vicinity.

* See also page 549 of this issue.

Correspondence

IRON BRIDGE ANALYSED

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—In your issue of March 7, Mr. A. W. Benn asked about the composition of the Iron Bridge, near Coalbrookdale, Shropshire, and its remarkable resistance to corrosion. It so happens that one of the original cast-iron spikes on the balustrade has just been analysed, and this shows the following percentage composition:—Total Carbon 3.71, Silicon 1.45, Manganese 1.11, Sulphur 0.062, and Phosphorus 0.48.

Probably most founders of 1957 would comment first on the low silicon, which may well have been characteristic of that area. By that time, pig-iron in that district was being made with coke and no longer with charcoal, but this element certainly looks low by modern standards. In his recent book, "Dynasty of Ironfounders," Dr. Arthur Raistrick comments that the bridge was coated with a special preparation of varnish before it was ever painted, and it may be that this old varnish had enduring properties which we have forgotten. As to whether the iron of the bridge had any particular property to resist corrosion is a point more for consideration by the British Cast Iron Research Association.—Yours, etc.,

R. S. DARBY,
Director.

Darby & Company (Birmingham) Limited.
April 29, 1957.

OLD METHODS—NEW PRODUCTS

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—In your report in the JOURNAL of April 18 under this title, Mr. E. C. Barker, in his address to the Coventry Rotarians makes a very sweeping statement to which I cannot entirely agree. Talking of art founding, he says "I think the foundryman's art is just as great as that of the artist who moulds the clay, because while a mistake with clay can be rectified, a mistake in bronze cannot." The difference between the founder's craft and the sculptor's is that the artist *creates* the model for the moulder to mould from. In the case of a portrait bust, for instance, the sculptor *creates* the likeness, which is in turn reproduced by the founder.

Art founders endeavour to reproduce the sculptor's work faithfully, but should a fault appear, the foundry chaser, in co-operation with the artist, can rectify a mistake and the result could not be detected by the average person after the final patination.

However, I do agree in substance with the remainder of Mr. Barker's remarks. Yours etc.

A. L. PARROTT,
Foundry Manager.

Morris Singer Company, Limited
April 23, 1957.

Forty Years Ago

Looking over a statistical table printed in the May 1917 issue of the JOURNAL, it was interesting to find that during the previous year no less than 105,204 tons of castings were made direct from the blast furnace. Amongst new companies registered appeared the names of Hill Top Foundry Company, Limited; J. Blakeborough & Sons, Limited; the National Smelting Company; Pemberton & Sons, Limited; Charcoal Iron Company, Limited; and Ward & Davidson, Limited. This was a "vintage" month as there were only two casualties amongst foundry registrations.

Precision Investment Casting Developments*

By W. N. Jones

Following a brief survey of basic manufacturing techniques of precision-investment casting, recent trends in this industry are outlined. Problems of design, dimensional tolerance and mechanical properties to be expected from castings so produced are among other matters commented upon.

As was to be expected from the nature of the audience when this Paper was presented, the chief emphasis was on the importance of the precision investment casting process to production engineers. However, even for those closely associated with the foundry industry, the disclosure of present trends and developments will be appreciated in the abstract which follows. For those readers not familiar with the previous reports on the process, the résumé of basic principles is invaluable.

Basic Process

When the engineer/designer submits a proposed casting to the founder for estimation, the founder needs to know the important dimensions that are to be reproduced within a specified dimensional tolerance, the quantity of castings required and the alloy and mechanical properties that are specified. Once these points have been settled, the founder produces a casting drawing which is the only standard worked to by the foundry employees, including inspection personnel. This drawing is used to prepare a pair of dies. These master dies may be manufactured from mild steel, brass, aluminium or special low-melting-point alloy, depending on the length of run *i.e.* the number of castings required to fulfil the contract. Next, wax is forced into the master dies and when cooled the wax pattern so produced is removed and checked for dimensional and angular accuracy.

Large numbers of the wax patterns are produced and mounted in "trees" on a wax frame, which is basically a combination of the feeder head and ingate. This mounting is effected by local fusion of wax with a hot iron. The pattern assembly is then dipped into a slurry (of finely divided particles of a highly refractory material suspended in liquid), drained and then sprayed with the same refractory material so that a layer about 0.015-in. thick is built up on the wax patterns. Spraying is carried out in order that any air bubbles left by the dipping shall be removed. The primary coat, as this refractory layer is called, plays a similar rôle to that of a facing sand in normal sand-moulding foundry practice. Considerable care has to be exercised when drying this primary coat, and it is effected under controlled conditions of temperature and humidity. The coated pattern assembly, which is mounted on a plate is then invested with a slurry of a lower quality refractory. At the Author's foundry, silimanite is employed at 100 mesh, bonded with a binder of the tetra-ethyl-silicate type. The invested assembly is next slowly heated to melt out the wax and thoroughly dried; then it is fired at a temperature of about 1,100 deg. C. in a furnace of the muffle type. This removes the residual wax, leaving a mould with cavities in the investment material of the same size and shape as the original pattern. While still hot, the mould is then placed over and clamped to a crucible containing the molten metal from which the castings are to be made. The assembly is then inverted, the metal flows into the cavities, assisted sometimes by gas pressure, applied to ensure that all the cavities are completely filled. After solidification, the investment is stripped from the casting, which is then shotblasted, the individual castings being subsequently separated from the assembly, cleaned and inspected. (At the meeting, the Author illustrated these production methods by means of simple but very effective colour slides.)

Tolerances

The Author later said that when the process was inaugurated, many claims were made as to the tolerances that could be obtained with this process and engineers rather took these claims to be the "answer to a maiden's prayer." Faith in the process suffered a blow from which the industry is only just beginning to recover when it was found that some of the claims could not be substantiated in practice. It is now accepted that casting dimensions can be guaranteed to within ± 0.005 in. per in. of the section. The Author of the Paper stressed the fact that if co-operation was received from engineers and close tolerances were only specified on essential dimensions, then precision founders' lives would be made much easier; in addition to this, they would know the specified dimensions could be achieved. With reference to holes, it was stated that, usually, these could be cast so that diameters were as accurate as those achieved by conventional drilling, however it was normal practice to leave the diameters so that reaming could be facilitated. The holes produced were, in any case, accurate enough for tapping or for clearance purposes.

The Author continued by saying that the nature of the industry—precision casting—results in a higher scrap rate than is suffered by ordinary foundries and this varies from five per cent. upwards, a normal average figure being about 25 per cent. Most of this was castings rejected by dimensional tolerances not being up to standard—in the Author's opinion, the inspectors in his company were a little too exacting. The cost of the process is inherently high owing to the complex processes that are involved; however when one considers recent increases in wages and materials, the

* Extracted from a paper presented recently at a meeting of the London section of the Institution of Production Engineers. The Author is on the staff of Deritend Precision Castings, Limited.

price of investment castings has remained fairly static. This the Author attributes to developments that have occured in the technology of the process.

Some Problems

Practically any castable alloy can be cast by the process, and the range is claimed to be greater than when founding by conventional methods. It is thought that with co-operation from the industry standards committee, and from the engineers and designers the complexity of the process can be reduced. At present the engineer specifies an alloy of a certain composition that will give desirable mechanical properties—usually one with which he has had previous contact. The Author's opinion is that as a rule mechanical properties only should be specified (as composition is normally relatively unimportant, save in special cases such as stainless steels, etc.), the choice of the alloy being left to the founder. The Ministry of Supply are aware of the problem, he said, and were attempting to introduce a range of alloys to be used by the founder as standards for the aircraft industry. This would be a big step in the right direction and it was hoped that the trend would continue.

Physical Properties

Alloys capable of being cast in the manner described embrace a wide variety of steels, ranging from plain low-carbon and alloy steels suitable for case-hardening, through high-tensile steels (usually of the nickel/chrome/molybdenum type), to stainless steels of the martensitic and austenitic types. The range also includes nitriding steels, spring steels and heat-resistant steels. Considerable use is also being made of Nimonic and Stellite alloys and similar heat- and abrasion-resistant materials. Investment castings in copper-base and aluminium alloys are also quite common nowadays. Whatever alloy be used however, it is essential that good mechanical properties be obtained and it is in this respect that the Author considers most of the more important developments in investment casting have been made.

Nowadays, the Author's firm is regularly producing castings which show properties comparable with those of forgings. This, of course, is a highly desirable feature and considerable effort is still being made and will be made for a long time to come, to improve even further the properties of investment castings. The industry is continually being pushed by the aircraft industry who are forever on the lookout for materials giving higher and higher strengths so that they can cut down on the weight of components.

For some time now, it has been possible to achieve extremely good ultimate-tensile-stress values; impact values, on the other hand, have not been so high. Generally speaking, at the present time it is possible only to obtain impact values in the region of 50 per cent. of those achieved on forgings of similar composition. This, however, is not yet good enough; experience shows it is possible to obtain in certain circumstances, impact values which are even better than those forgings. So far, however, uniformity in this respect has not been reached and a lot of development work is going forward at the present time to try to achieve these high values consistently.

"Niggers in the Woodpile"

To this end, compositions of alloys (and here the Author was particularly referring to steels) are being closely investigated and particular reference is being made to trace elements which can have effects on the properties of castings quite out of proportion to the actual amount of the particular element present in the alloy. Particular "niggers in the woodpile" are elements such as oxygen, nitrogen, hydrogen and aluminium; the maximum permissible amount of sulphur and phosphorus must also be well below that tolerated normally in bar stock. The presence of any of these elements can be extremely detrimental to the properties of the casting, due to the formation of non-metallic skins around grain boundaries, with consequent embrittlement. Similar trouble can occur when casting the Nimonic series and Stellite alloys, due to the segregation of oxides around the grain boundaries, so that satisfactory techniques for melting these alloys have had to be developed. Nevertheless, it is fairly common practice nowadays to cast steels with tensile ranges up to 80 tons per sq. in. ultimate and with high degree of ductility, so that it is clear quite a lot of progress has been made.

Future Development

While progress will continue to be made in the heat-treatment of alloys and in the selection of alloys of a suitable composition, many people nowadays think that investment casting will eventually have to make use of vacuum casting, *i.e.* both melting and casting in vacuum. By doing this, it is possible to rid the melt of all gases, oxygen, nitrogen, hydrogen, etc., and excellent results have already been achieved.

Continuing his review of development work, the Author referred to several other matters as follow:

Standardization of Alloys has received recent impetus from the Ministry of Supply, and from the formation of the European Investment Casting Association; it is thought that the British Standards Institution is investigating the problems of standardizing the alloy range for the industry.

Frozen-mercury Process. This process is reported to facilitate the production of castings with complicated sections and coring. However the process is costly, partly due to the cost of mercury, which is frozen to produce the patterns, and partly due to the problems involved in working at low temperatures in this poisonous medium.

Polystyrene. This is being used for patterns when long runs are envisaged. It is burnt out in the normal manner.

Investment X. This method employs a standard type of wax assembly; however, instead of complete investment, the mould is produced and thickened by repeated dippings and drying of the pattern in a succession of slurries to make a workable thickness, in point of fact the process is very similar to the

shell-moulding method employed in some foundries in that the mould is basically a shell. An advantage of this process is that there is a considerable reduction in the quantity of refractory material used.

Soluble-wax Cores. The Author stated that these are used for producing complex coring of the wax patterns, and are located in the wax-injection dies in a similar manner to normal foundry practice. The wax pattern being injected round the core which is dissolved with water.

Establishment of a Steel Foundry at Chittaranjan, India

The following is the text of an announcement issued in respect of the establishment of a steel foundry in India at Chittaranjan:—

The Ministry of Railways (Railway Board) are inviting proposals for setting up a steel foundry at Chittaranjan, West Bengal, with the technical collaboration of a reputed foreign steel foundry. The proposed steel foundry will form a complement to the existing Locomotive Works at Chittaranjan and should have a planned output of 6,000 tons of finished casting with a possibility of expansion up to 9,000 tons per annum. The firm selected for collaboration will be fully responsible for:

(i) The design and layout including the buildings and production equipment; (ii) procurement, inspection and transport of the plant and equipment to the site; (iii) supervision of erection and installation of important production equipment and (iv) successful operation of the foundry.

The selected firm will also be responsible for training Indian personnel in technical and managerial functions and should also provide competent key personnel in the initial stages. The offer should give complete details of cost, men and material required, earliest date of commissioning the foundry and payment terms. Water, electric power and other raw materials required will be arranged by the general manager, Chittaranjan Locomotive Works. Further particulars are available in the tender hand-out which will be supplied on application. Offers should be addressed to the Secretary (M), Railway Board, New Delhi, India, and should reach him on or before June 6.

A copy of the tender documents are available for loan to UK firms in order for receipt of applications. A photo-copy set can be purchased from Export Services Branch, Lacon House, Theobalds Road, London, W.C.1, for 9s. Cheques and postal orders should be made payable to the Principal Accountant, Board of Trade. In order to avoid delay, firms wishing to collect photo-copy sets of tender documents are advised to notify the branch in advance of their requirements.

Reference number (ESB/10019/57) should be quoted in any correspondence, with the Export Services Branch, relating to this call for tenders.

International Nickel Prospects

By 1961, the nickel-producing capacity of the free world would increase to approximately 650,000,000-675,000,000 lb., said Dr. John F. Thompson, chairman of the International Nickel Company of Canada, Limited, at the company's annual meeting in Toronto. Compared with the 1956 position, it represented an increase of about 50 per cent.

Assuming defence demand remained at its present level and that nickel was not taken in 1961 for Government stockpiling, the 1956 rate of world civilian consumption of nickel would have to be increased by more than 75 per cent. to absorb the output resulting from the expected expansion in production capacity, he said.

It was evident that a huge new demand must be stimulated, and Dr. Thompson said the company for many years had been developing new markets and new applications, and it was intensifying these efforts. At the same time, he expressed the belief that the company would be selling nickel in the future in larger quantities than ever.

The chairman told shareholders that earnings for the first quarter of 1957 were expected to make a satisfactory showing, although they might not reach the figure of $23,702,000, in terms of US currency, or $1.63 a share on the common stock, reported for the fourth quarter of 1956. Lower copper prices and a strike at the company's Huntington Works, in West Virginia, starting in January and continuing until the end of March, were adverse factors affecting the earnings for the first quarter. Dr. Thompson said the recent nickel price increase was one of the factors which had had a favourable effect on earnings for the quarter and should have a similar effect for the year.

English Electric's Offer

Underwriting started on April 24 for issues of debenture stock and ordinary shares by the English Electric Company, Limited, to raise nearly £16,000,000 for the repayment of bank indebtedness. Some 35,000 ordinary shareholders are offered 3,044,344 £1 ordinary shares at 50s. each on the basis of one for every five held on April 8. The shares will carry the right to all dividend for 1957, which, it is expected, will be maintained at 14 per cent. on the larger capital.

The debenture issue is for £9,000,000 in 5½ per cent. stock, 1977-82, at a price of 97. It will be offered on May 3 to the company's debenture, preference, and ordinary holders (about 45,000) registered on April 8. The first interest payment will be £2 7s. 2d. per cent. on December 16.

At the end of 1956, the companies of the group in Britain had £180,000,000 of orders on hand. Their annual turnover has risen rapidly in the last three years and must rise further if it is to keep pace with the current expansion of the order-book. The invitation to invest more money in the business is based on the growth in output, which, exceeding all earlier estimates, continues to call for more buildings, plant, and working capital, and on the board's "great confidence" in the future.

A BRITISH ENGINEERING GROUP is inviting the world to make use of its "know-how" in the export field. The originators of the scheme are the Dohm Group, Limited—with headquarters at Victoria Street, London, S.W.1—who propose to provide manufacturers in every country with an international buyers' index and a mobile team of specialists to solve their export problems.

European Common Market

An up-to-date study of the scheme for a European free trade area in which Britain would be linked with the Continental common market was published on April 18. For the first time details of the common market treaty, recently signed in Rome, are published in an English translation, no official English text yet being available. The treaty needs, and has obviously received, considerable and careful study, and "European Free Trade Area, a Survey for Industrialists" (FBI, 21, Tothill Street, London, S.W.1, price 6s.), is worth much more than a passing glance from anyone associated in any way with Britain's overseas trade.

The main impact of the proposed free-trade area is summed up as follows:—"It will represent a change of course for British commercial policy comparable in significance, though opposite in direction, to the United Kingdom's abandonment of free trade in the early 1930s." The main question now would appear to be to secure the best terms possible, and to ensure that the interests of British industry are protected and promoted in the area.

The FBI's recommendations for the Government's attention are five-fold. To be seriously considered are:—The problem of making adequate provision for replacement of fixed assets in view of the present taxation treatment of depreciation; ensuring adequate transport facilities between the UK and Europe; the disadvantages, if any, which British industry and commerce might suffer as a result of the Restrictive Trade Practices Act, 1956, compared with Continental competitors; powers for speedy action against harmful dumping; and special measures to help some firms and industries likely to be hard hit by increased imports from the Continent.

Safety and Factory Efficiency Exhibition

The 1957 Safety and Factory Efficiency exhibition (SAFE), to be held in the Bingley Hall, Birmingham, June 14 to 21, will be the fourth in the series. Types of exhibits include all kinds of safety equipment for use in factories; material-handling equipment; up-to-date methods of guarding machines; fire-fighting equipment; hemp and wire ropes; gas equipment; electrical equipment; and a full range of protective clothing, footwear, goggles, and the like.

In addition to the exhibits, a special stand will draw attention to the increasing work now being carried out at the Industrial Safety Training Centre in Birmingham, which, during its first year of operation, has had more than 2,000 trainees at different courses at the Centre. This Centre gives practical-safety training to crane operators, slingers, fork-lift truck operators, building operatives, foremen and supervisors, and covers a wide variety of subjects, all connected with day-to-day activities in any industrial concern.

Mr. ESMOND MORSE, who relinquished the managing directorship of Brymbo Steel Works, Limited, Brymbo, near Wrexham, at the end of last year, in favour of Mr. H. W. A. Waring, resigned from the chairmanship of the company and the board of directors on April 16. Mr. K. S. PEACOCK has been appointed chairman and Mr. D. BRUCE-GARDNER and Mr. C. R. WHEELER have been appointed directors. Many tributes were paid to Mr. Morse by the directors, staff, and workmen and presentations were made to mark his retirement.

Working to get Well

Occupational therapy is gaining increased success in hospitals and rehabilitation centres where it has been found that the recovery of men, accustomed to mental or physical activity in their working life, is hastened by giving them something congenial and constructive to do to while away long hours of convalescence.

The principle of occupational therapy has been developed at the rehabilitation centre of the works' medical services department of the Steel, Peech & Tozer branch of the United Steel Companies, Limited, Rotherham. The exercises necessary for restoring injured limbs to health and strength have been ingeniously combined with the production of safety gloves—a job which alone is well worth doing. The centre contains the various machines for glovemaking, all of which have been adapted to meet the individual needs of each patient.

Remedial exercises, which can be monotonous in the extreme, are now performed without the patient realizing that he is doing them; and added to that is the beneficial effect on the patient who continues to "go to work" every day and who knows that, far from being even temporarily consigned to the scrap-heap, he can do (and get paid for) a 40-hour, five-day week without prejudicing his claim to benefits or to his right to take legal action should he wish to. So far, some 25 patients have received treatment, most of them having returned to their former employment. While in the "getting better" stage, they have made several hundreds of pairs of gloves which have been issued throughout the works and so helped to save others from injury.

Executives tour German Industry

In the last five years the Industrial Welfare Society has organized study tours of industry in Germany, Holland, Sweden and Switzerland. A third tour of German industries which is now being made, has a three-fold purpose. In the first place it is hoped to learn something of the German attitude to work and how that attitude is sponsored and maintained; the responsibilities of German managements; the system of communication; the effectiveness of personnel policies; and the part the trade unions play at the present time and hope to play in the future. This study will be made by means of works visits and discussions with members of managements and trade unions. The second purpose of the tour is to give junior and middle management the opportunity to examine, in company with a group of other like-minded individuals, industrial systems that are not too diverse from those in our own country. The third aim is that those who take part shall learn something to their advantage from what they will see and hear, and have the opportunity of working out with their fellow delegates how these experiences can be applied in their own companies.

LOUGHBOROUGH COLLEGE OF TECHNOLOGY announce a one-year residential post-graduate course in industrial engineering, suitable for all types and branches of industry, commencing in mid-July and terminating mid-September. A series of courses in work-study and other management and productivity subjects for industrial executives has also been arranged, which commence this month. Full details are obtainable from Mr. James France, head of the Department of Industrial Engineering, Loughborough College, Leicestershire.

WEST RIDING FOUNDERS *put the FLAGS OUT*

The West Riding branch of the Institute of British Foundrymen are the hosts at this year's conference in Harrogate, and following the usual custom a series of works visits have been arranged to foundries in this area, so that, metaphorically speaking, ten West Riding founders will be putting out the flags of welcome* on June 21. In order to give intending participants an idea of which foundries to choose when returning their conference booking forms the following brief accounts are provided.

Hopkinsons, Limited

In 1843, Joseph Hopkinson commenced business in a small way at East Parade, Huddersfield, as a manufacturer of engineering fittings and particularly of steam-engine and boiler accessories. The newly established firm soon moved to premises at Spring Place, off Lockwood Road, where two four-roomed cottages were converted into workshops. At this time, boiler equipment was often crude in design and workmanship, and serious accidents were common. Joseph Hopkinson and his associates set about to remedy this state of affairs and, from the commencement of the firm's activities, played a pioneer part in the design and construction of safety boiler-mountings. For a time, the steadily expanding firm occupied the Globe Works in Leeds Road, then in 1871 transferred their activities to a relatively large factory off Viaduct Street, nearer to the centre of Huddersfield. Here, for a further 33 years, they developed so that they were among one of the better-known valve manufacturers. The present Britannia Works, opened in 1904, have been considerably extended from time to time, one of the most important additions being the construction of the steel foundry in 1912; this itself was extended during the second world war. No effort has been spared to maintain all departments of the works with the most up-to-date equipment and methods. In 1926 the firm became a public company, taking the present title of Hopkinsons, Limited.

The firm's valves, boiler mountings and associated equipment have a world-wide application, especially in the field of high-pressure installations such as electrical-generating stations. The majority of power-stations in Great Britain are equipped with Hopkinsons' boiler-mountings, as are numerous important power-stations and industrial plants abroad, and the firm's products are being also utilized in atomic power-stations. At present the firm employs approximately 2,200 persons of whom about 500 are engaged in the iron, steel and non-ferrous foundries.

Steel Foundry

The utilization of the firm's products, especially in the high-pressure and high-temperature installations of modern power-stations, necessitate the production of the highest grade of steel. The melting plant in the steel foundry consists of a stock converter and an electric furnace, both of approximately 3½ tons capacity. In addition to valve and boiler-mounting castings the company undertakes orders for steel castings in large quantities in sizes from about 20 lb. to 2 tons. Routine processes are very largely mechanized; moulding sand being mechanically prepared, mixed and transported by elevated conveyors to hoppers over the moulding

*The picture used for the heading (appropriately showing flags of welcome) is of the frontage of the Bradford works of the English Electric Company, Limited, a description of which is included in this article.

FIG. 1.—*Sizeable steel castings being produced on a roller conveyor in the steel-foundry of Hopkinsons, Limited.*

machines from which it is fed direct to the moulding boxes. After casting (Fig. 1) the boxes are mechanically shaken out and the sand automatically transferred to the sand recovery plant. Cleaning and fettling are performed by "Hydroblast" equipment, as in Fig. 2, rotary- or drum-type "Wheelabrators" or, to a much smaller extent, by ordinary shot-blast methods. Pneumatic and "Hicycle" portable fettling-tools are also provided. Annealing is carried out in either electric or gas-fired stoves. The floor area occupied by the steel foundry is approximately 93,000 sq. ft.

Iron Foundry

In the iron foundry, with an area of approximately 16,800 sq. ft., the molten metal is produced in a cupola of orthodox design. This foundry is also, to a large degree, mechanized; moulding sand being prepared and mixed mechanically and transported to hoppers above the moulding machines. Metal is poured into the majority of boxes while on roller conveyors, pouring being performed from runway-carried ladles. The boxes are knocked out mechanically and sand reclaimed, as in the steel foundry. Fettling is carried out by "Wheelabrators."

Non-ferrous Foundry

The non-ferrous foundry, having an area of about 27,000 sq. ft., is in two sections, one for bronze and one for special metals, the latter include the firm's "Platnam" alloy, which is used for all their valve discs and seats by reason of its extremely high-resistance to erosion and corrosion. The melting equipment in the bronze foundry consists of indirect-arc rocking-furnaces and gas-fired crucible-furnaces. In the special-alloys foundry there are two pairs of high-frequency induction furnaces, this arrangement ensuring that two furnaces can be in use at any given time. The majority of the jobs are machine moulded; cores are pneumatically blown, and baked in a continuous stove.

Services and Control

To maintain the high quality of production, a comprehensive check is kept on all incoming materials and semi-finished products. A sand-laboratory checks all incoming sands and refractories and also continuously tests samples from each of the production lines. Stage-analysis of steel is carried out in a laboratory adjacent to the melting furnaces; the final analysis and that of all incoming metals are effected in the main laboratory. To meet the extensive schedules of routine analysis, spectrographic and absorbtiometric methods are used, the former making use of a Hilger large-spectograph. The metallographic section, employing electrolytic polishing, makes use of a Reichert microscope, a Cooke Troughton and Simms binocular - stereoscopic microscope and other modern instruments. The large X-ray laboratory uses 400-kv. X-rays, and isotopes; complete isolation and protection are provided for all personnel in this department where seven simultaneous ex-

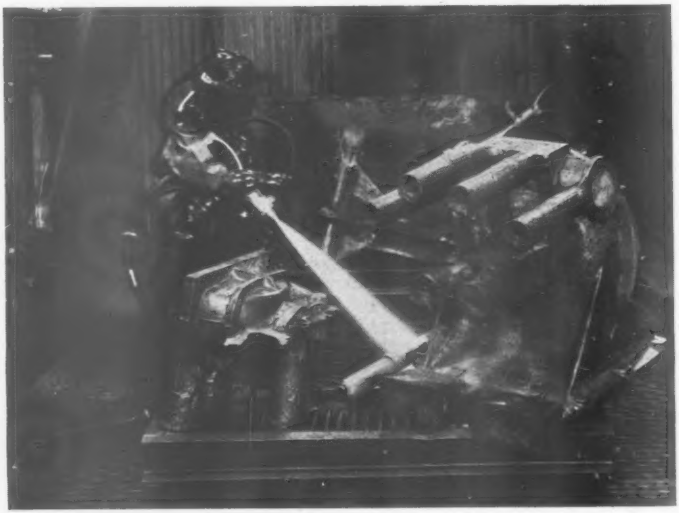


FIG. 2.—*Three steel castings being cleaned in the Hydroblast cubicle at Hopkinsons steel foundry.*

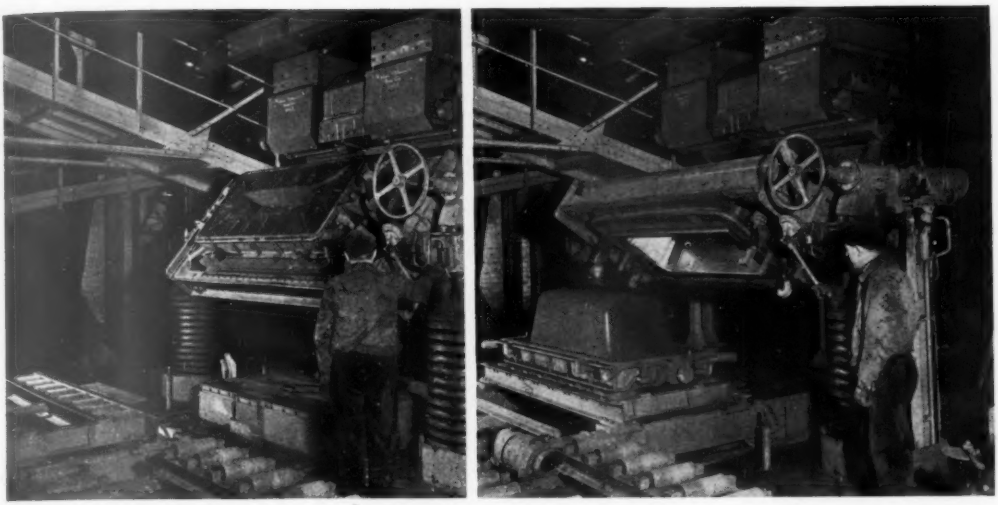


FIG. 3.—*Two stages in the machine moulding of cast-iron baths at Wilsons & Mathiesons, Limited. The completed mould is delivered on a trolley running on the roller-conveyor system.*

posures can be taken. All casting methods are fully developed with the aid of radiography before being standardized in the foundries; after this, routine checks on quality-maintenance are systematically carried out.

A large patternshop with modern equipment and an extensive pattern store are conveniently situated to meet the needs of the three foundry departments. Works amenities include full canteen facilities, with provision for either hot meals or "snacks," changing lockers and showers, a modern surgery, a lending library and a well-organized social and sports association.

Wilsons & Mathiesons, Limited*

Wilsons & Mathiesons, Limited, is situated in Armley, Leeds, and the works' buildings cover an area of approximately 400,000 sq. ft., the foundry embracing some 94,000 sq. ft. The history of the firm dates back over 100 years and for nearly 80 of these the firm has occupied the present premises in Armley. The company manufactures solid-fuel cooking and heating appliances such as the "Yorkist," "Yorkvale," "Yorkseal," "Heatmaster" and all-night fires including the "Loray" and the "Fulham." Gas-cookers are being manufactured under the trade name "New World." In addition to these products domestic baths are made in varying sizes, and are finished in white, or coloured vitreous enamels. There is also a large press-shop with presses up to 350 tons which fabricate articles, not only for the firm's own products, but also for the Radiation Group generally, of which Wilsons & Mathiesons, Limited, is one of the manufacturing centres.

This varied production is effected by over 1,000 employees; of the 150 in the foundry, seven are engaged on melting, four on coremaking, 60 are moulders and there are 24 fettlers. The present melting programme of up to 10,000 tons of iron per year, supplies the needs of two mechanized light-castings moulding plants and a mechanized plant for moulding baths, in addition to the requirements of plate-moulders and those engaged on making baths by hand. The plant includes two 50- and two 36-in. dia. cupolas and a horizontal coreblower. The range of the company's products requires iron castings varying from a few ounces to about half a cwt. for the solid-fuel and gas appliances, and castings for baths weigh from two to four cwt. (see Figs. 3 and 4).

Amenities

The company has a comprehensive apprenticeship scheme for both craft and student apprentices and these usually number between 20 and 30. Every facility for combining practical and theoretical training at school is granted. Among the welfare amenities of the factory is the new ablution-block with showers and foot-baths for all foundry personnel, and an ambulance room where fully qualified nurses are in attendance 24 hours a day during the working week. There is a large canteen where meals are supplied at reasonable prices and also a welfare clothing-store which offers a selection of protective and ordinary clothing which may be purchased by weekly deductions from wages. The company has a "live" sports and social club which organizes competitive tournaments on a departmental basis for most indoor games, and there is a large sports ground at Calverley a few miles outside the city where league and friendly matches

* See also FOUNDRY TRADE JOURNAL, April 25, page 515, where an account is given of the firm's knockout, incorporating novel features.

FIG. 4.—*General view of the moulding shop at Wilsons & Mathiesons, Limited. Moulds and cores can be seen in various stages of assembly, on the double-track conveyor system.*

are played. A well-appointed pavilion at the sports ground was officially opened by the chairman of Radiation, Limited, in 1954, to celebrate the centenary of Wilsons & Mathiesons, Limited.

West Yorkshire Foundries, Limited

West Yorkshire Foundries, Limited (see Figs. 6 and 7), is located at Sayner Lane, Leeds, 10, and covers an area of 375,750 sq. ft., of which some 266,580 sq. ft. is occupied by buildings; actually over 15 years the area occupied by the company's buildings has grown six-fold. Approximately 1,300 are employed, 1,150 of them in the foundry. Expansion has been considerable since 1946 and the foundry is now producing a total of 400 tons of iron and 45 tons of aluminium-alloy castings per week. The range of products includes sand and gravity-die castings for the automobile and aircraft industry; zinc-alloy pressure-die-castings and iron castings, mostly of the heavily-cored type, for the automobile industry (it should be appreciated that the firm is a subsidiary of Leyland Motors, Limited).

The iron foundry is a highly mechanized green-sand moulding plant, and is divided into four separate units, each being fed by a mould conveyor; in conjunction with these are three distinct sand plants. A floor-moulding section permits the fulfilment of small quantity orders. The iron foundry is served by seven cupolas ranging in size from 30 to 40-in. dia., and a large coremaking section comprising three separate coreshops; coreblowing being extensively employed. A considerable part of the output from this foundry consists of cylinder-blocks and -heads, for this reason a jigging section (Fig. 5) has been established where castings are averaged and location points machined. On this type of production, accuracy of moulding-box pins and bushes is most important and special attention is given to these aspects.

The aluminium foundry, a smaller unit, is also partially mechanized, there being a sand plant and mould conveyor, in addition to the pressure- and gravity-die-casting departments, and a floor-moulding section.

Hepworth & Grandage, Limited

The St. John's factory of Hepworth & Grandage, Limited, celebrated its Golden Jubilee on April 1. The company has been concerned throughout its existence with the production of pisons, piston rings, liners and gudgeon pins.

The factory covers a 25-acre site of which some 125,000 sq. ft. are occupied by the foundry, this is primarily concerned with the production of castings for internal use in the manufacturing of the company's products, but also produces a considerable tonnage of castings for automobile and other engineering products. Being specialists in high-duty irons has also enabled the foundry to produce general castings for outside consumers and this form of business is continually expanding. Of the total of 3,200 employees in the factory the foundry employs some 580.

There are six foundry sections, each having its own melting equipment, they are: A centrifugal-foundry which produces cast-iron cylinder-liners and piston-ring sleeves, from which the piston rings are machined; a mechanized foundry which pro-

duces cast-iron single-cast piston rings and small general castings; a foundry for the production of cast-iron pistons and general castings up to 56 lb.; a jobbing foundry for cast-iron liners, piston-ring sleeves, pistons and general castings up to 8 cwt.; a shell-moulding foundry for precision type castings up to 56 lb. finished weight, and an aluminium foundry which produces gravity-die-cast pistons. The annual output is in excess of 15,000 tons, this including a diversity of specifications ranging from high-duty grey iron to spheroidal-graphite and austenitic cast-iron. The salient features of the foundries are the extensive use of electric-melting in the form of high-frequency furnaces (Fig. 8), rocking-resistor furnaces and a low-frequency holding and superheating furnace. A well-equipped metallurgical-control laboratory works in close liaison with the foundries. Cupola melting is accompanied by the use of the latest form of air-weight and air-humidity control, while charging is aided by the use of overhead electro-magnetic cranes for conveying charges to the platform.

Services

Both mechanized foundries are equipped with modern mechanical methods of sand-preparation and overhead sand-feed, a pallet conveyor being used in the piston foundry for the transfer of moulds from pneumatic-moulding machines to the pouring zone. In the mechanized single-cast-ring foundry, piston-ring moulds are produced on electro-magnetic squeeze machines by stack moulding (Fig. 9) process, moulding boxes and completed stacks being conveyed to and from the machines by bogies mounted upon rails. This ring foundry produces up to 1,000,000 rings per week. The centrifugal foundry is equipped with "single-die" horizontal spinning machines, a development of which has been the installation of two four-station semi-automatic spinning machines.

One of the most interesting features of the foundry is the established process of melting cast-iron swarf in the high-frequency furnace, a gas-fired holding furnace of 15 tons capacity is run in conjunction with this furnace, ensuring that metallurgical uniformity of the iron is maintained. A large programme involving further capital expenditure is in hand and includes the installation of a further high-frequency furnace and also a co-ordinated spark-arrestor and slag-granulation plant.

An apprentice school has been in operation for some 12 months and it is of interest that all apprentices, whether engineers, foundrymen or metallurgists, now spend a period of time in the foundries, for it is reasoned that maximum co-operation between all departments is of paramount importance in the engineering industry. The company attaches great importance to the welfare of its employees and a new bathhouse and toilets have been opened recently. The social club, run by a works committee, provides accommodation for many varied functions and games and constitutes an important aspect of company life. In addition to the social club a sports club is in existence and

FIG. 6.—*Part of the extensive patternshop at West Yorkshire Foundries, Limited.*

FIG. 5.—*Automobile cylinder-block produced in the iron foundry receiving attention in the jigging section of West Yorkshire Foundries, Limited.*

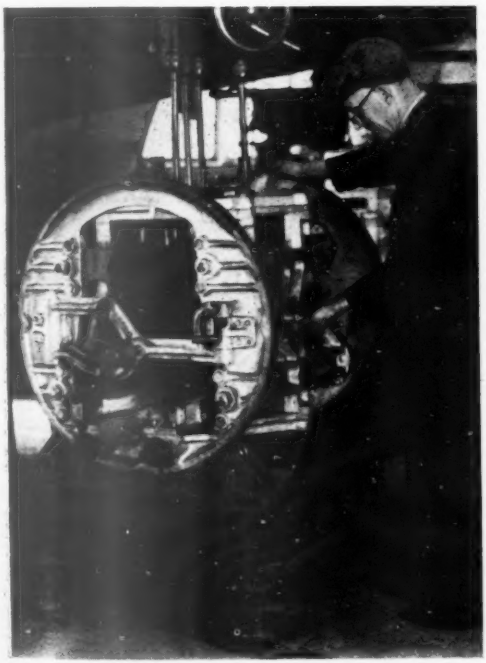


FIG. 7.—*Casting bay of West Yorkshire Foundries, Limited, showing the unusually designed but very effective fume-extraction panel.*

provides all the necessary sports for those who require them.

Modern Foundries, Limited

Modern Foundries, Limited, is a subsidiary of the well-known Asquith Machine Tool Corporation. The main foundry has been re-organized and equipped throughout with the latest foundry plant and labour-saving devices, with a view to facilitating the economical and rapid production of machine-tool castings, not only for the associated companies of the group, but also for other customers.

A two-storey building, adjacent to the main foundry, houses the works' offices, laboratories, patternshop, pattern stores, and moulders' washing and locker accommodation. The laboratories are arranged to deal with the routine and metallurgical control of both the foundry, and products of the associated company, William Asquith, Limited. Control covered by the laboratories falls into classes as follows:—(1) Maintenance of the quality of raw materials; (2) technical supervision of melting processes; (3) quality control of castings by supervision of moulding and coremaking processes; (4) technical control of heat-treatment and of electro-plating.

Patternshop

The patternshop is divided into two bays, one being devoted to large pattern assembly and checking (Fig. 10). The heavy woodworking machinery is sited down one side of the other bay, leaving a clear space between the patternmakers' benches, which are situated on the opposite side of the bay. The lighter woodworking machines are placed alongside these benches. After checking, the patterns are lowered to the ground floor through a well by means of a 2-ton crane, for issue to the foundry, or for storage. The pattern store is comprehensively indexed, the smaller patterns being stored in racks, whilst the larger patterns are arranged in runways.

Melting Plant and Foundry

The large stockyard is served by a light-railway system leading to the cupola hoist, which also brings up return metal from the large foundry. The main cupolas for this foundry, consist of one of 12 and one of 8 tons per hr. capacity. Two 25-cwt. cupolas serve the small mechanized foundry. All cupolas are charged from the same level, despite the fact that the small-castings foundry is situated at a higher level than the main one. A mains-frequency induction-furnace is shortly to be installed for the melting of special irons.

The main foundry comprises four bays, 300 by 45 ft., three of the bays containing three overhead travelling cranes in each. The main bays are traversed by three broad-gauge tracks, one of which also forms a roadway to give access for outside motor transport to enter any bay in the foundry. The four bays are utilized as follow:—

Bay 1. Here, bench coremaking and sand-mixing is carried out; the finished cores are transported on a 12-in. gauge roller-conveyor to an Acme vertical corestove for baking, prior to the final dressing, blacking and inspection. Both the core and moulding sands are mixed in an August-Simpson 2F machine (Fig. 11), the core-sand being delivered by means of skips running on the 18-in. gauge light-railway system which intersects the foundry. The moulding sand is discharged on to a rotary-table, feeding an elevator to the main-storage hopper.

Bay 2, the medium castings bay, is devoted to the production of standard castings comprising radial drilling-machine pillars, arms, baseplates and worktables. The moulds are made by means of a Jackman 10-ton jolting-machine. The two halves of the pattern are jig-located in the moulding boxes to eliminate the necessity of using patternplates, or accurately locating the pattern in the jolting-machine table. The pillars are cast vertically in a pit, the metal being dropped down the inside of the mould by means of spray runners, a distance sometimes as great as 18 ft. The cores for these pillars are made in loam, and are fashioned on strickle machines driven by lathe-headstocks having quick-operating detachable-clutches. After removal of the castings, the moulding boxes are placed on a Sterling knock-out from which the reclaimed-sand is delivered, after suitable treatment, to two storage hoppers situated near to the jolting machine. This sand is then fed to the moulds being jolted, by means of an extending conveyor.

Bay 3 is used for the production of castings up to 40 tons in weight, which are made from loose patterns, using pneumatic rammers and a portable type Sandslinger to facilitate ramming. The moulds are dried *in situ* with portable coke-fired air dryers.

Bay 4 is the machine-moulding bay for medium castings which are smaller than those made in Bay 2; these are produced with a 4,000-lb. Herman jolt/squeeze/rollover/draw moulding machine. This machine is operated by a night-shift to reduce the load on the overhead cranes during day-time operating. A small department using the CO_2 Process for the manufacture of moulds and cores for a 5½-ton workplate casting is also included, whilst another part of the bay is devoted to the manufacture of medium castings from loose patterns. In addition to the above there is also a higher-level (floor) annex, where the production of smaller castings is undertaken.

The fettling department extends across one end of the three main moulding bays. All castings are shot-blasted; fine fettling is carried out using portable heavy-duty grinding machines, with attached dust-extractors, and Hicycle grinders. A further development is now being planned whereby the foundry will be extended, and a Hydroblast unit incorporated for the de-coring of the castings.

The present output of the foundry is 600 tons of machine-tool castings per month, with a total payroll of 205 men, including 42 employed on mould production and 30 on core production.

J. Blakeborough & Sons, Limited

The firm of J. Blakeborough & Sons, Limited, has an historical background covering a period of nearly 130 years, the last 90 and more of which have been devoted exclusively to the design and manufacture of valves for fluid control. It is claimed that to-day the company is one of the largest concerns of its kind in the country, handling valves in a wide variety of types for practically all the principal fields of use—waterworks, electricity-generating stations, drainage schemes, irrigation and river control, marine and dock installations, and industrial plants of many kinds. Recent developments include specialized types of valves for the nuclear-energy field, and large contracts are at present in hand for the atomic-power programme. The range of sizes extends from a fraction of an inch in bore up to large power-operated valves of 8-ft. dia. and over. The first buildings on the present main factory site at Brighouse were erected in 1875. The works now cover an area of 15 acres, and employ about 950 operatives, while subsidiary plants are in operation in the neighbouring town of Greetland and at Benoni, South Africa.

Iron Foundry

The iron foundry (Fig. 12), together with fettling sections, etc., occupies an area of approximately 80,000 sq. ft. The metal, a high-duty cast iron, grades A, D, and E, is produced by the Meehanite process at the rate of 250 tons per week. This is melted in a central cupola installation comprising two 48-in. dia. water-cooled units, one basic-lined and one acid-lined, with mechanical swivel-charger, automatic weighing-recorders, and automatic air-weight and water-temperature controls. Castings produced range from a few ounces up to

FIG. 8.—*General view of two of the high-frequency melting furnaces and the gas-fired holding-receiver at the foundry of Hepworth & Grandage, Limited.*

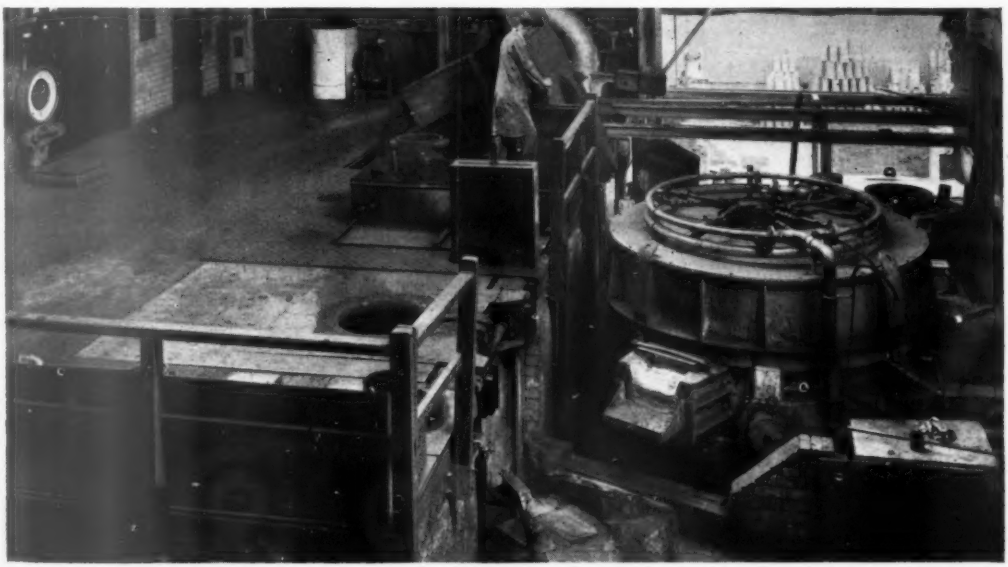


FIG. 9.—*Iron being poured into stack moulds in one of the foundries of Hepworth & Grandage, Limited.*

12 tons in weight. A fully-mechanized moulding section, with mechanized coremaking, handles the repetition work; heavier, individual castings are produced in the general-moulding section, with the assistance of power-operated Sandslingers. The sand-handling and preparation plant is fully mechanized, and deals with up to 200 tons per week, coremaking (Fig. 13) throughout the company is by the Carbon-dioxide Process.

Bronze Foundry

The bronze foundry covers approximately 20,000 sq. ft. Metals produced include all general engineering copper/tin bronzes; manganese-bronze; aluminium-bronze; and two grades of high nickel/tin alloy. The melting plant comprises three semi-rotary furnaces and three Morgan tilting-crucible furnaces, handling a total of some 20 tons per week. Castings range from a few ounces up to 2 tons in weight; like the iron foundry, the shop comprises a fully-mechanized section for repetition work, and a general section for heavier individual items. The Carbon-dioxide Process is again used throughout in the preparation of cores and dry-sand moulds.

Adjoining the foundries are the laboratories, covering a floor area of some 4,000 sq. ft., and comprising extensively equipped general chemical and mechanical testing sections. Here work includes the checking of incoming raw-materials and the testing of metals produced by the foundries, together with more general metallurgical investigations and research in such fields as corrosion resistance (an important factor in fluid control work); a separate section is devoted to sand testing.

FIG. 10.—*One of the two bays in Modern Foundries, Limited's, patternshop, soon after erection. Nowadays the shop is more congested, for the sets of large pattern and corebox equipment are assembled here, ready for use by the foundry.*

FIG. 11. — *Jackman 10-ton capacity jolt-type moulding machine at Modern Foundries, with the Augusts' sand plant, at the side and rear. The delivery side of this comprises two 20-ton hoppers with rotary-table discharge to a single delivery belt.*

English Electric Company, Limited

The works in the Bradford area of the English Electric Company, Limited (see page 533), was originally built in 1915 as a forge for the production of shells; foundrywork was not undertaken until March, 1920. Production at that time was confined to castings for domestic appliances, but in 1937 the foundry was partially mechanized. This plant, which has been slightly modified, is still in operation to-day for the manufacture of general engineering castings (Fig. 14). In 1947 a new foundry incorporating two fully-mechanized moulding plants commenced operation. Castings produced from the foundry range from 4 oz. to 35 cwt. in grey iron, high-duty irons of the Meehanite class, and spheroidal-graphite and high-phosporus iron for vitreous-enamelled products. A large variety of

FIG. 12.—*Mechanized iron foundry of J. Blakeborough & Sons, Limited, showing completed moulds, ready for casting, on the roller-conveyor system.*

FIG. 13.—*View of the core-assembly section of the foundry of J. Blakeborough & Sons, Limited. Some of the massive cores for power-operated valve castings can be seen in the foreground.*

work is undertaken and the company utilizes the output in its wide range of products including electric motors; generators; diesel engines; fuse-gear; switchgear; and electric cookers, refrigerators, and washing machines. Melting facilities include cupola furnaces (for grey and high-duty irons) and resistor rocking furnaces for the production of spheroidal-graphite iron.

Serving the foundry is a large well - equipped patternshop which caters for both metal and wooden patterns; moulding being effected in Sandhurst sand, for general engineering-castings and in Chelford for castings to be vitreous enamelled. A small shell-moulding unit has been recently installed and incorporates the Polygram equipment. Plain-squeeze, jolt/squeeze and jolt machines are used for differing classes of work.

A new building incorporating modern shower-baths and locker facilities, a first-aid section and a canteen was opened in 1949. In recent years a complete new patternshop with increased storage capacity, and extensions to the coreshop and grinding and fettling departments have been erected; in addition, a paint-spraying section, 3- to 6-ton annealing furnaces, and improved despatch facilities have been provided.

The company operates an engineering apprenticeship scheme, which incorporates a foundry-training programme for suitable candidates. From these are chosen the future supervisors and technicians required on the shop floor.

E. Green & Son, Limited

The firm of E. Green & Son, Limited, was founded in 1821, but it was the invention of the "fuel economizer" by the founder of the firm which initiated the considerable expansion that has occurred. To-day, the works and foundry cover an area exceeding 16 acres, with more than 1,000 employees, 250 of whom are directly engaged on work in the foundry. The company specialize in fuel-economy equipment for all boiler plants with a steam-raising capacity of over 2,000 lb. per hr., air-heaters and air-preheaters and cargo-heating systems for oil tankers; the manufacture of these products involves close control of the quality and the production of castings which must be both corrosion and heat resisting. Some 300 tons are produced each week, approximately half of this tonnage being accounted for by castings weighing only a few pounds.

After being situated in various parts of Wakefield, Edward Green, the founder of the company, built

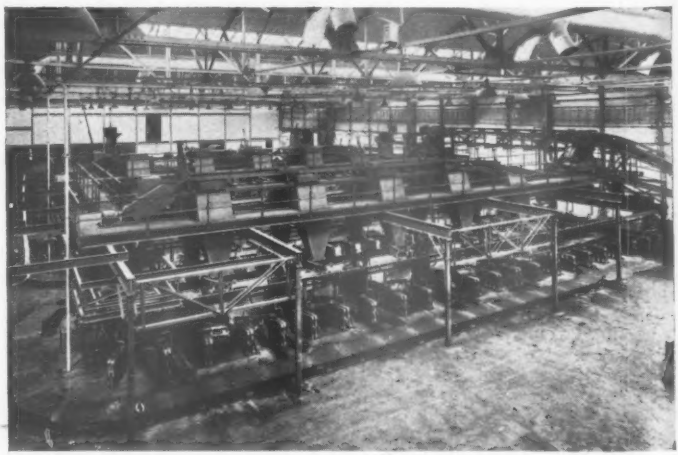
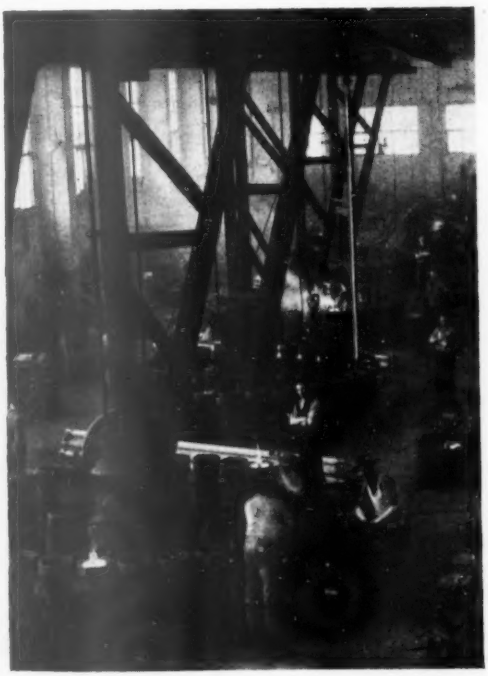


FIG. 14.—*General view of the mechanized foundry at the Bradford works of the English Electric Company, Limited.*

FIG. 15.—*Part of the shell-moulding department of E. Green & Son, Limited, Wakefield—where the production of certain components has been made completely automatic.*

his foundry and machine shops on the present site in 1864; the company have been fortunate in acquiring adjacent land for expansion, to enable them to meet their commitments, and further extensions are now being planned or executed. Two major developments in recent years were the installation of a mechanized bay in 1945, and the introduction of shell moulding (Fig. 15). The company claim to have been one of the pioneers of the shell-moulding technique and are now producing, on a mechanical basis, 40 tons of shell-moulded castings per week; they have also produced a fully-automatic shell-coreblower, producing cores at the rate of 360 per hour without an operator.

FIG. 16.—*Vertical-casting "roundabouts" for economizer tubes at E. Green & Son, Limited; core placing is in progress in the centre pit.*



Castings produced by the company range from vertically-cast tubes (Fig. 16), for the vertical economizer, to shell-moulded sleeves for high-pressure economizers; heat-resisting damper-doors and frames and pressure-resisting valve-bodies and gilled tubes.

The tubes and elements for economizers and air-heaters need the most careful control of both metal and method of manufacture, as they are pressure vessels, the tolerance in body thickness being very small; the original type of economizer tubes are still being vertically cast. The shell-moulding method together with the mechanized bay have, however, enabled the high-pressure economizer-sleeves to be produced at the rate of many thousands per week.

Further Developments

The many changes and reorganizations which have taken place in the foundry in recent years, are shortly to be consolidated. The remaining floor space, covering some two acres, and the plant, including sand and melting plant, are being modernized and where possible mechanized. The scheme is expected to take two to three years to complete. The machine shops, which employ approximately twice the number of workpeople compared with the foundry are comprised, for the most part, of modern well-equipped buildings, the original buildings erected in 1864 still stand, however, and in these are housed the specialized machinery for the manufacture of the vertical-tube economizer. The remainder of the shops are devoted to the various processes required in the manufacture of the many different types of economizers and airheaters that are produced by the company. The foundry personnel have at their disposal a modern ablution block which is supplied with hot water and heated from an economizer in the boiler house. In common with the remainder of the employees, they have the use of a large well-equipped canteen and an excellent social club.

H

FIG. 17.—*General view of the improved patternshop of Catton & Company, Limited, showing the layout of the new equipment that has been recently installed including a universal miller and planer in the background.*

Catton and Company, Limited

Founded in 1875 by the grandfather of the present chairman, the organization of Catton & Company, Limited, has continuously expanded over the years, until to-day it can rightly claim pride of place amongst leading British steelfounders. The present plant is designed for an annual output of approximately 10,000 tons of carbon, low- and high-alloy steel castings ranging in weight from a few ounces to 5 tons. The works occupy a total area of some five acres, whilst approximately 680 personnel are employed for the manufacture of Catton's only product—*viz.* steel castings. A great deal of rebuilding, expansion and re-equipment has taken place over the last few years and consequently visitors will see new or re-modernized buildings and much new plant, the more notable of which is briefly reviewed in the ensuing paragraphs.

Melting Plant

The " bulk " liquid-steel supply is obtained from two electric-arc furnaces each of which is powered by a 2,500 kva. transformer, and this fact, together with the use of oxygen, ensures the tapping of 3½ to 4 ton charges every two hours. Complementary to this is a high-frequency-induction furnace plant producing relatively small amounts of both carbon and high-alloy steels for shell and specialized sand castings.

Patternshop

Here again, modern equipment such as a universal miller, planer, etc., has been installed in a new building, capable of housing some 40 patternmakers and some idea of the layout of this 5,500 sq. ft. shop may be obtained by reference to Fig. 17.

Moulding

Extensive mechanization of the moulding processes has been carried out by the use of jolt/squeeze moulding machines for the production of moulds in the 2 to 3 ft. sq. range, and a section of this shop is illustrated in Fig. 18. For larger moulds of a repetition nature, a Beardsley and Piper Speedslinger was recently imported from the US. Whilst maximum advantage from this unit will not be obtained until the shop, in which it is sited, is reorganized and re-equipped (including the provision of an indigenous 40 tons per hour sand plant) the current benefits—although of a somewhat limited nature—are nevertheless quite apparent.

In addition one bay is still devoted to hand-moulding methods and here a specialized team of skilled moulders and closers, together with a small apprentice " school " produces some 45 to 50 tons per week of " one-off " items—a very valuable aid in balancing customers' repetition requirements with their single casting needs.

Feeding both this section and the mechanized moulding bay is a modern sand plant, complete with a cooling and de-silting unit, and capable of providing sand from its two roller-type mills at the rate of 20 tons per hour. Finally in this review of the moulding facilities of the company, mention should be made of a shell-moulding section employed for the lighter range of repetitive work.

Coremaking

To allow coremaking to keep pace with the results of this extensive modernization of the moulding sections, a new " two-floor " coreshop is—at the time of writing—almost nearing completion and coreblowing and coreshooting should be much in evidence at the time of the IBF visit.

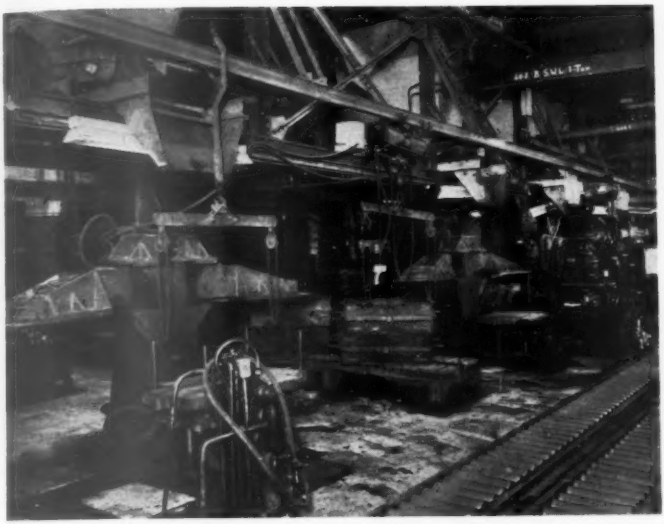


FIG. 18.—*View of the mechanized moulding shop at the foundry of Catton & Company, Limited, showing part of the roller-conveyor system and the jolt/squeeze moulding machines with overhead sand-delivery equipment.*

Fettling and Heat-treatment

Amongst the more notable features of the fettling and heat-treatment departments are a mechanized layout for the fettling of castings in the 40 to 400 lb. weight range and a relatively new shop devoted to the dressing of links for tracked-excavator equipment, etc. and for the quenching and tempering treatments of these and other low-alloy steel castings.

Services

Appreciating that efficient production units are not, in themselves, sufficient for success in this day and age of steelfounding, careful attention has been paid to the building up of adequate services in the way of methods, inspection, metallurgical, cost and production control, and works engineering departments. Evidence of the activities of these specialized sections may be seen not only in the building housing these particular staffs but also in the works itself, the products passing through and the tempo at which the various activities are carried out. Finally, mention should be also made of the attention paid to the welfare side of steelfounding at Catton & Company, Limited, and to this end, canteen, washing and medical facilities, etc., are provided. Recently, for example, to assist the part-time medical officer in his care of all workers, a medical X-ray unit has been installed—yet one more instance in this so-called age of "automation" that progressive executives are more interested than ever before in the general welfare of the men who "man" the equipment in our factories.

FIG. 19. *View of the Apprentice-training department at the works of William Asquith, Limited.*

William Asquith, Limited

Established in 1865, the firm of William Asquith, Limited, is one of the leading producers of machine tools; in fact the company claim already to operate the largest plant in the world devoted exclusively to the manufacture of drilling and boring machines and it is still expanding.

Since the beginning of the century, the firm has

FIG. 20. *One of the spacious erecting shops of the William Asquith, Limited, works showing the assembly lines for the erection of the radial-drilling machines.*

specialized on the design and manufacture of drilling and boring machines and have become famous for the development of the radial-drilling machine. Asquith's originated the famous central-thrust radial-drill and the simplified type for plate and girder work. They were also pioneers of the practice of mounting the driving motor directly on the spindle slide and the application of truly concentrated control.

The activities of the Halifax works have been supplemented by the erection of an extensive modern factory at Shrewsbury, which will facilitate the building of the heavier types of horizontal boring machines, etc. The Halifax works, covering a site of about 12 acres, have been progressively developed on the most modern lines, and plant and methods are organized in such a way as to ensure rapid and economical production; the buildings are well lit and scientifically planned to conform to the most up-to-date methods of manufacture. The various machining bays are arranged so that work flows easily through the various stages of manufacture, one section being devoted to heavy machining, another for medium machining, whilst turret lathes are accommodated in a department of their own. Another section houses the grinding, gear-cutting and small-parts machining, and a well-equipped modern toolroom is maintained. Inspection is carried out at each stage of manufacture and inspection stations are conveniently sited for this purpose.

The assembly of radial slides is carried out on a line-production basis and a large building is devoted to the final erection of this type of machine. Another erection bay caters for the building of large horizontal borers and the unit-head multi-spindle types for which there is great current demand. A well organized apprentice training department is maintained by the company.

Products include radial-drilling machines from small sizes to extra heavy machines of up to 12 ft. radius for drilling 5 or 6 in. dia. holes; a full range of floor-type horizontal boring machines with spindles from 2½ to 10 in. dia.; vertical-drilling machines of all sizes, portable universal radial-drilling machines and unit-head-type multi-spindle machines for all purposes including the building up of in-line transfer machines.

A NEW FACTORY has been built at Waltham Cross (Essex) by E. N. Bray, Limited, electrical control gear manufacturers, of Walthamstow, London, E.17. As a result the company expects to increase production by 100 per cent. over three years.

ORDERS valued at £5,750,000 have been secured by Demag A.G., from the Turkish Karabük Steelworks and the newly-formed Istanbul Cable Manufacturing Company. The German firm is to supply rolling-mill installations.

Book Review

La Chimie de la Dolomie (Chemistry of Dolomite) by Andre Guedras, D.Sc., and Marcel Guedras. Published in French by Eyrolles, 61, Boulevard Saint Germain, Paris V.; price 1,000 francs (plus extra for posting outside France).

In this book of some 90 pages may be found most of the known fundamental data and much also that reveals the authors' intimate knowledge of the less-generally-known facts about dolomite and related minerals. Though the emphasis is on chemistry, the book contains much useful physical data and is well illustrated by appropriate graphs and tables.

The origin of dolomite is described and the distinction made clear between true dolomite, the stoichiometrically correct double carbonate of calcium and magnesium, and the many forms of magnesian limestone. The theories of formation of the dolomite and related rocks are adequately dealt with and examples are given of the types, ages and origins of various deposits in France and other European countries.

A general description of the more general properties of dolomite is included but the authors have, logically, dealt with the more specific properties in context with the appropriate sections on applications. Thus a short chapter on decarbonatation precedes that on the industrial calcination of dolomite for refractory materials and the recarbonatation phenomenon is similarly brought out in connection with its effects upon the thermal extraction of magnesium metal from dolomite. Ten pages are devoted to descriptions of theories and techniques for the extraction of magnesium from dolomite but little information is given on the industrially important sea-water process in which dolomite and sea-water, as it were, mutually extract magnesium (as magnesia) from each other.

The use of burnt dolomite for construction and repair of open-hearth and electric furnaces is described and the authors give some interesting personal experiences of this technique. The chapter on stabilization of dolomite deals with the theories and chemical aspects of various processes in some detail. A brief description is given of the modern industrial stabilization process in a later chapter on the use of dolomite in ceramics. Some of the information on this topic is a little out of date.

The authors have well described the uses, from a chemical standpoint, of dolomite in such diversified fields as glass manufacture, water treatment, agriculture and blast-furnace practice. Though the cost at 1,000 francs is high by British standards, it is felt that the book contributes much of value to the present state of knowledge on the subject.

C. S. H.

Publications Received

Review of Progress 1956—Report for Employees. Issued by the United Steel Companies, Limited, 17, Westbourne Road, Sheffield.

It would be difficult to envisage a better method than the one adopted in this booklet for telling in simple language what has been accomplished by a very large company. It is beautifully illustrated in colour and in its 30 pages deals with all activities likely to interest the employees. It does not include "division of the cake" and its many variations, as by now the pattern of the distribution of the money received during the year and the expenditure is well known. The reviewer congratulates those responsible for the publication on having done a remarkably good job.

Transport Age, Vol. 1, No. 1. Issued by the British Transport Commission, 222, Marylebone Road, London, N.W.1.

This new well-printed magazine is to be issued quarterly. The first number carries an interesting article about mechanical railway marshalling yards, where intelligent use is made of gravity. The magazine is excellently illustrated and good use has been made of colour. It is to be distributed to the principal leading and manufacturing customers of British Transport.

Canteens in the U.S.A. No. 3; Recipes for 50, by Winifred McCullough. Published by the Industrial Welfare Society Inc., 48, Bryanston Sq., London, W.1; price 3s.

This is a collection of 42 recipes, about a third of which are too typically American to be acceptable to the ordinary British working-man's palate. There is a fairly comprehensive list of sandwich fillings, most of which are already known to any enterprising caterer. The reviewer does not consider this booklet to be good value for English money.

New Catalogues

Unless otherwise stated, JOURNAL *readers can obtain copies of these publications by writing to the address quoted.*

Pneumatic Tools. In leaflet T.E.213, Armstrong Whitworth & Company (Pneumatic Tools), Limited, 40, Broadway, London, S.W.1, cover the No. 5V series of pneumatic hand-tools for grinding, sanding, and wire brushing. The interesting claim is made that these tools are six times quieter than most tools of a similar type—though the figure is not reduced to decibels! There is an incredible amount of data crammed into these four pages, which detracts from the general appearance—especially page two—but the information given does enhance the usefulness of the pamphlet.

Electric Jib-cranes. Herbert Morris, Limited, P.O. Box 7, Loughborough, Leicester, in section 30—presumably of their general catalogue—describe and illustrate a wide range of electric jib-cranes, which are so useful in jobbing foundries where the overhead-travelling cranes tend to be overworked. Most of the applications illustrated are single-duty ones—serving individual machines—where again they save the use of the overhead equipment. The catalogue runs to eight pages and is of pleasing design, carried out in green.

Inhibition of Corrosion. Midland Tar Distillers, Limited, Oldbury, Worcestershire, have published a brochure which covers the potentialities of Teramins—"mixed heterocyclic tertiary amines of specified distillation range." However, as one reads on, one learns of the material's use as an inhibitor when sulphur-containing fuels generate films of acid on ironwork and set up corrosion. The pamphlet tells of a number of laboratory experiments and field trials which show the effectiveness of Teramins as a rust inhibitor in this and other cases.

Portable Air-compressors. Broom & Wade, Limited, High Wycombe, Bucks, have prepared a well-presented brochure covering the "Whirlwind Uniflo" rotary two-stage portable air-compressor. The book is well written and clearly illustrated and good use has been made of colour printing in its 16 pages.

Notes from the Branches

Birmingham

The March meeting of the Birmingham branch of the Institute of British Foundrymen was held at the James Watt Memorial Institute on the last Wednesday of the month, when Mr. H. M. Howard, M.A., lectured on "Bellfounding." He commenced by saying that bellfounding was different from ordinary non-ferrous foundrywork in that the casting had to be good to listen to as well as to look at. The craft dated from several centuries BC, and modern bellfounding, as known in the Western world, commenced about AD 400 in Italy, St. Dunstan introducing it into this country in the 10th century. Most of the early bellfounders were of the monastic or itinerant type who cast their bells on the site. Some bells in daily use were reputed to be at least 700 years old.

With the aid of a very fine series of slides Mr. Howard dealt with modern methods for making the core and the cope by strickling, and explained how bells were lettered and decorated by means of both the "lost-wax" process and by impressing patterns into the mould face. Bell metal, he said, generally consists of a high-tin bronze with the copper content ranging from 80 to 84 per cent; this ensures that the metal contains a mixture of the alpha solid solution of the hard and brittle delta constituent, the delta content being responsible for the tone of the bell. As the size of the bell is increased, the tin content is generally reduced. Slides were next shown of bells being tuned by turning the inside of the bells while they were held vertically in a special lathe; a tuning fork being used in order to check the note. In conclusion Mr. Howard illustrated methods of hanging bells for the ringing of chimes and included several pictures of carillons. Mr. D. Bailey proposed the vote of thanks, seconded by Mr. Dunlop, and the meeting concluded with a discussion which fully maintained the high standard of the paper.

Mr. F. Gartland reading his "Wilkinson Competition" paper at the annual meeting of the IBF Lancashire branch, with Mr. W. S. Spenceley, the 1956/57 branch president on his right, Mr. E. H. Beech, president-elect seated behind, and Mr. F. Lord, Burnley section president on his left.

Lancashire

Twin brothers carried off the honours this session in the "John Wilkinson" short-paper competition organized by the Lancashire branch of the Institute. They are Mr. Fred and Mr. Michael Gartland, aged 19 years 11 months, who respectively gained first and second awards; both are in the fourth year of their apprenticeships at the foundry of Distington Engineering Company, Limited, Workington, Cumberland. Mr. C. F. Lawson, foundry manager at Distington has a third reason to be proud about the result, as the paper adjudged third was also by one of his fourth-year apprentices—Mr. A. Graham.

French Foundry Congress

Thirtieth Meeting, in Paris, June 3 to 6

The 30th Congress of the *Association Technique de Fonderie* is to be held in Paris from June 3 to 6, and details can be had by writing to Mr. R. Delpuech, the administrative secretary, at 2 Rue de Bassano, Paris, 16. Below is given a list of the papers to be presented: "Suggested Cast Tensile Test-piece for Sand-cast Non-ferrous Alloys," by D. Arnaud and E. Lefebvre; "Influence of Blast Input, Coke Percentage, and Coke Size on the Working of the Cupola," by M. Decrop and F. Danis; "New and Simple Method for the Recuperation of Heat for the Heating of the Cupola Blast," by G. Ulmer; "Economic Method for the Treatment of Liquid Iron by Magnesium-containing Ferro-alloys when making Spheroidal-graphite Cast Iron," by N. Volianik; "Determination of the Cross-sections of Feeding Systems for Castings made in Sand Moulds," by Ch. Trenkle; "Study of Some Light Alloys for the Making of Sound Castings, especially for Plumbers' Fittings," by L. Grand; "Statistical Control applied to the Foundry," by J. Largeteau; "Thermal Treatment in Salt Baths," by O. Bader and D. Godot; "Foundry Planning," by R. Sauquet; "Properties and Uses of some Nickel/Copper/Chromium Irons," by G. Henon; "Control Methods for Dextrine used in Coremaking," by Konlein; "Ingot-moulds Symposium," introduced by J. Durand, with "Some Properties of Irons for Ingot Moulds," by M. Ferry and J.-C. Margerie, and "Survey of Slab Ingot Moulds," by J. Duflot.

Guest Papers

Included in the programme are a number of papers from overseas including: *United States:* "Where do Pinholes in Castings Originate," by C. A. Sanders: *Great Britain:* "An Evaluation of the CO_2 Process," by J. E. O. Little; *Poland:* "Non-magnetic Cast Iron," by Z. Tyszko; *Czechoslovakia:* "Rational Modernization of Foundries" (with film), by A. Plesinger, and *Italy:* "Refining of Heat-resisting Hyper-eutectic Aluminium/Silicon Alloys," by Sergio Gallo.

MOST OF THE WORK on the main building of the new £2,000,000 titanium fabrication works at Waunarlwydd, Swansea, for Imperial Chemical Industries, Limited, is complete and plant installation is proceeding. The first unit of the sheet rolling equipment, together with electric furnaces, is now operating and some of the finishing plant has been started.

Nuisance by "Noise"—Features to be considered by Founders

*By W. A. Hines**

The nuisance of noise in modern life has now become so emphasized that industry generally is taking steps to reduce it within limits of practicality and cost. It is now known that excessive noise can have deleterious effects on efficiency in addition to being a nuisance to people living in the immediate vicinity, through noise emanating from certain industrial plants. The foundry is certainly no exception and noise levels which build up within become excessively disturbing to both employees and the adjacent community.

Acoustical engineers throughout the country are tackling this problem with vigour, and attempts are being made to find ways and means of providing materials and methods to abate the nuisance. Some noise problems can be overcome by the use of comparatively low-cost acoustical materials, providing such materials are installed correctly in suitable locations. Where noise is due to specific machinery, methods can be employed to reduce the nuisance by the location of suitable treatments in special constructions in order to give a degree of sound isolation.

Architectural Problems

Architectural acoustics fall mainly into three categories, sound absorption, sound isolation and sound control. In the case of sound absorption, by the introduction of suitable treatment, reverberation time can be controlled and brought to optimum conditions which prevent build-up of noise and, therefore, improve working conditions by providing auditory comfort for the occupants. When means to secure optimum working conditions are applied, enhanced output can result, just in the same way as good lighting, for instance, can affect the comfort of employees.

Foundry buildings create very special problems for an acoustical engineer because they are usually large and of considerable volume. The existence of smoke and dirt, and their effects on acoustical materials, likewise can present considerable difficulties. Therefore, in most cases, care has to be taken to select a treatment which will have not only a high coefficient of absorption but will resist smoke, dirt and corrosion as much as possible.

Perforated asbestos sheet is a good material to apply in constructional work, as this treatment will stand up to conditions in the foundry. It can be installed as 12 by 12-in. squares backed with mineral rockwool to form units which can be secured by special fixing clips to steel T-pieces. This type of treatment fixed either to walls or roof will have the effect of deadening sound within, but it will also provide thermal insulation which may not be desirable in a foundry. Because of the flexibility in applying this material, areas required for ventilation purposes can be left free.

Reverberation

Reverberation times against a given volume for a building are decided upon by subjective assessment, and in most new industrial plants a "decay"† time as short as practicable is employed in order to increase the decay of sound as much as possible within practical limits, and to prevent build-up of intensity. Foundrymen are well aware how the noise of dressing castings varies not only with the type of material (steel being worst) but also with the size, shape and construction of the shop. Each and every problem has to be considered in accordance with its particular characteristic, and it is essential to take noise-level readings over wide frequency-bands and to measure existing reverberation times, in order to determine the exact quantity of material to be installed to give maximum result for a given outlay.

Foundry Machinery

Special readings of noise intensity must also be taken for specific machines in order to determine each and every noise source so that equipment can be designed for the purpose of providing practical absorbent treatments in predetermined locations. Complete isolation of noise is a very much more difficult problem and presents many snags, mainly due to the need to ensure untrammelled operation of equipment and, whilst it is possible to surround certain machines or enclose them in soundproof cabins, the cost of such an installation, consistent with practical operating requirements, is nearly always prohibitive. A great deal can be done, however, with furnace blowing fans and intake and extract ducting, if the question of noise is tackled during installation, but once the noise reaches, or is generated at the furnace, further difficulties can arise in dealing with it.

The overall control of transmitted noise from inside to outside the foundry, causing nuisance to the surrounding community, can be dealt with, but again at fairly high expense and where intensities within are over 100 db‡ (and in some cases noise levels can reach as high as 120 db), 45 to 50 db reduction must be aimed at. In order to achieve this, all windows, doors and outlets, such as ventilators, have to come under consideration. Nevertheless, by intensive survey and consideration for treatment, some abatement can be achieved by consider-

* The Author is general manager of the acoustics division of John Dale, Limited, and is an associate member of the Acoustical Society of America.

† "Decay" time is that period elapsing between the making of a sound (such as a pistol shot) and its ceasing to echo.

‡ db = one decibel, an arbitrary unit for measuring the intensity of sound and based on the energy of propagation of the wave form.

Nuisance by "Noise"

ing each problem in proportion to the amount of its contribution to noise production. The use of modern soundproof doors, the construction of sound "locks," the introduction of specially designed units in ventilating systems or adjacent to blowing equipment, and the proper installation of general acoustical treatment and devices, will do much to reduce overall intensities and, providing an acoustical engineer is consulted, a great deal of expense can be saved.

Structure-borne Noise

The question of structure-borne noise has not yet been mentioned, but this presents very special difficulties, as, for instance, where machines are bolted down to concrete floors or installed in pits, which are physically connected to the fabric of the building, the noise made by such machines travels structurally through floor, walls and structural steelwork.

Methods can be employed to isolate machinery, but where very heavy equipment is laid down, extremely acute problems arise in connection with its isolation. Special isolators have been and can be designed on to which machinery can be located, even to the extent of placing such equipment on structural frames and in turn supporting the frames on suitable isolators. Alternatively, compliant materials can be used to divorce the machine beds or bases from the main floor structure, thus preventing or reducing the amount of transmitted vibration.

Each and every job must by virtue of its complexity be considered separately, and materials and methods—or the combination of various materials in special constructions—must be employed to overcome the excessive transmission of noise and vibration.

Company News

TRIPLEX FOUNDRY, LIMITED—The company has acquired the business of Henry Harrison & Sons, Limited, padlock makers and pressworkers, of Willenhall (Staffs).

G. & J. WEIR, LIMITED, engineers and founders, of Cathcart, Glasgow—Consent has been received from the CIC to the proposed issue of 8,073,228 ordinary shares of 5s. each as capitalization of reserves. The necessary meeting to give effect to the proposal will be convened in the autumn.

HOPKINSONS, LIMITED, engineers, etc., of Huddersfield—The final dividend is being raised from 17½ per cent. to 20 per cent., making 30 (27½) per cent. for the year to January 31, 1957, on the £700,000 ordinary. Profits, at £865,822, and the net balance, at £420,822, are slightly down (£876,541 and £455,541).

GEORGE COHEN 600 GROUP, LIMITED—The directors announce that 98.88 per cent. of the offer of 2,500,000 5s. ordinary shares at 8s. 6d. per share was taken up. Applications for excess shares covered the shares available approximately 37 times. Applicants up to 20 shares received allotment in full; other applicants were each allotted 20 shares.

F. PERKINS, LIMITED, diesel engine manufacturers, of Peterborough—During 1956, £655,000 was expended on capital assets and further capital expenditure has been planned for the near future. Up to now the time has not been propitious to raise additional finance. Group stock and work in progress amounts to £3,414,152 (£3,592,482) and consolidated net profits contracted from £418,817 to £348,075. The dividend, 10 per cent., remains the same.

MAVOR & COULSON, LIMITED, mining machinery manufacturers, of Bridgeton, Glasgow—The company is raising its final dividend from 7½ per cent. to 10 per cent., making 17½ per cent. for 1956 on £700,000 ordinary, compared with 12½ per cent. It is proposed to make a one-for-four rights issue of new ordinary at a price to be intimate later, to be followed by a 100 per cent. free scrip . The cash issue, it is understood, is to finance expansion programme which will include major ensions at the Redan Street, Bridgeton, works. ensions at the East Kilbride and South African tories are also being considered. Group net profit last year was £305,203 (£201,061).

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

769,871. Union Carbide, Limited, Grange Mill Lane, Wincobank, Sheffield, Yorks.

Low-alloy steel for use at low temperatures. The patent refers particularly to alloys suitable for use in applications where superior impact resistance at sub-zero temperatures is required.

769,950. Electric Steel Foundry Company, 2141, North West 25th Avenue, Portland, Oregon, USA.

A centrifugal casting process and moulding apparatus; the invention is particularly useful in the casting of a large number of individual castings within a single annular mould, but has other applications. The molten metal is poured into a mould mounted suitably to permit rotation, and the mould is rotated about an axis to form a casting. An annular core carrying a radial recess is mounted in the mould, spaced from one end, The molten metal is poured into a reservoir at one end of the mould and is restrained there until the metal attains the peripheral speed of the mould. It is thereafter released from the reservoir to flow longitudinally in a thin annular stream along the inside diameter of the core.

770,016. Lion Foundry Company, Limited, Kirkintilloch, near Glasgow, Scotland.

An improved mould assembly for the production of hollow bodies by centrifugal casting, in which a profile is formed around the periphery of one end of the body. The primary object of the invention is to provide for casting centrifugally, integral fixing ears or lugs on such a hollow body (see also Patent No. 762,524. FOUNDRY TRADE JOURNAL, January 24).

770,195. Harvey Machine Company, Inc., 19200, South Western Avenue, Torrance, Calif., USA.

An aluminium-base alloy for use where very high strengths are required. It has a composition of zinc 6.2 to 7.8, copper 1.8 to 2.6, magnesium 2.4 to 3.0, and chromium 0.10 to 0.40 per cent. The balance being aluminium.

770,326. Concast A. G., 9, Rue D'Italie, Geneva, Switzerland.

A process for continuous casting, the principal object of which is to mitigate the harmful effects of casting at high rates and greatly reduce surface imperfections.

British Industries Fair

Entire Show concentrated at Castle Bromwich (May 6 to 17)

The British Industries Fair, to be held at Castle Bromwich, near Birmingham, from May 6 to 17, will be open daily (except Sunday) during the hours of 9.30 a.m. to 6 p.m. except on the last day, when it closes at 4 p.m. Visitors should note that Saturday, May 11, is the day on which "works parties" are specially arranged. This year for the first time, the exhibition is being held solely in Castle Bromwich; previously the exhibits have been divided between Olympia, London, and the Midland site, with engineering and "foundry" concentrated at Castle Bromwich. The siting of the whole Fair in one venue, it is claimed, should prove advantageous both for exhibitors and visitors, and efforts have been made to ensure that adequate travelling facilities are available. Ample car-parking space has been allocated in the immediate proximity of the Fair, and the motoring associations have agreed to provide adequate signposting. Those travelling from London, by rail, are advised that services from Euston and Paddington will be augmented by special trains, including a "BIF Express" which will depart from Euston at 8.30 a.m., and will run direct to Castle Bromwich station, adjacent to the Fair. Main-line trains from the following will also stop at Castle Bromwich: Bradford, Bristol, Cardiff, Chesterfield, Cleethorpes, Derby, Leicester, Newcastle, Nottingham and York. In addition to these, a frequent service will be maintained with the City stations.

This year, for the first time, three other exhibitions will be running at the same time as the BIF. These are the Instruments Electronics and Automation Exhibition, at Olympia (May 7 to 17); Protective Clothing and Safety Equipment (May 13 to 17, also at Olympia) and the Gifts Fair at Alexandra Palace (May 13 to 17).

Information to hand indicates that there will be some 60 foundries in addition to steelworks and engineering works exhibiting products of interest to JOURNAL readers this year.

Casting Exhibits

Among firms showing castings are the following:—A. C. Castings (1946), Limited; Albion Foundry, Limited; A.P.V.-Paramount, Limited; Aston Brass Company; W. & T. Avery, Limited; B.S.A. Tools, Limited; Castings, Limited; C.A.V., Limited; Compton Castings, Limited; Copper & Alloys, Limited; T. H. & J. Daniels, Limited; Deloro Stellite, Limited; English Steel Corporation, Limited; Follsain-Wycliffe Foundries, Limited; Frank R. Ford, Limited; Gloucester Foundry, Limited; Great Bridge Foundry Group; Guest Keen & Nettlefolds (Cwmbran), Limited; Hale & Hale (Tipton), Limited; Hanley Foundry Company, Limited; John Harper & Company, Limited; C. & L. Hill, Limited; Izons & Company, Limited; Lost Wax Castings, Limited; Joseph Lucas, Limited; John Maddock & Company, Limited; Maples Foundry Company; Midland Metallics, Limited; John Mills & Company (Llanidloes), Limited; J. V. Murcott, Limited; Peglers, Limited; H. & F. Precise Castings, Limited; Qualcast, Limited; Geo. Salter & Company, Limited; Saunders Valve Company, Limited; Shelvoke & Drewry, Limited; Suffolk Iron Foundry (1920), Limited; Steel Nut & Joseph Hampton, Limited; Stothert & Pitt, Limited; L. Tomey & Company; Triplex Foundry, Limited; and Wedgewood Foundries, Limited.

Notes on Individual Stands

The following brief information concerning stands will be helpful to founders who intend to visit the exhibition, though, of course, it is in no way exhaustive. Stands directly or indirectly exhibiting foundry equipment and supplies number about forty.

ADAPTA-CHARTS, LIMITED (*Stand C.*219) are to show their Movigraph system for the flexible visual-recording of any state, process or operation. (Details of the system were published in the JOURNAL, April 11, 1957, p. 453).

KEITH BLACKMAN, LIMITED, London (*Stand D.*276). In addition to their range of fans and blowers the company will exhibit their self-adjusting oil separator under the gas display section. Cupodel hot-blast cupola plant and Tornado shot-cleaning equipment will also prove to be of interest on this stand.

FLETCHER MILLER, LIMITED, Hyde, Cheshire (*Stand D.*510), will be exhibiting cores made of their Almarine core oil using 0.75 to 1 per cent. of the mix. The baking time is short when carried out at normal stove temperatures of 200 to 220 deg. C. It is claimed that the resulting cores give high dry-strengths and break down easily after casting.

FULLERS' EARTH UNION, LIMITED, Redhill, Surrey (*Stand D.*326) will exhibit a range of their products including "Fulbond," a clay bond specially developed for moulding sands—preparing synthetic sand, strengthening natural sand and regenerating return sand. It is claimed that the material increases the green-strength of CO_2-bonded sands and of oil- and cereal-bonded core sands.

ALFRED BULLOWS & SONS, LIMITED, Walsall (*Stand D.*743/642). Being shown here for the first time in this country is the new 600-cub. ft. per min., Hydrovane compressor, manufactured under licence from Whittaker Hall & Company, Limited. In addition the company will display a complete range of stationary and portable compressors, both engine and electrically driven. A range of the Bullow's spray guns and spraying equipment will also be on view, together with a 15-ft. water-wash spray-booth.

BROOK MOTORS, LIMITED, Huddersfield (*Stand C.*615/514). Among the display exhibited by this company will be a selection of British Standard drip-proof and fan-cooled motors which will include two items, recently introduced, which are interchangeable with the existing range. These are a fan-cooled slip-ring motor

British Industries Fair

with internal rings, and a crane motor of either cage or slip-ring type. Control gear shown will cover hand-operated and automatic push-button starters, and a comprehensive range of push buttons and limit switches.

GEORGE ELLISON, LIMITED, Birmingham (*Stand C.*617/516) are to display a wide range of electrical switchgear and a selection of hydraulic valves that are claimed to be particularly suitable for inexpensive, yet effective, forms of automation. Among other electrical gear on display will be a range of circuit breakers.

THE OWEN ORGANIZATION (ENGINEERING SECTION), (*Stand D.*616/717). In addition to a selection of caravan and trailer wheels and axles, a range of "dead" axles is to be shown including straight- and dropped-beam types for caravans, trailers, agricultural machinery, industrial trucks and mobile appliances of load-carrying capacity from 15-cwt. to 4 tons. Examples of metal pressings including deep-drawn work will also be on view together with precision-turned repetition components. Steel storage equipment and pallets will be displayed in conjunction with the firm's trucks.

HIGGS MOTORS, LIMITED, Birmingham (*Stand C.*601). This company will be drawing attention to their range of plant built to the new draft British Standard for 3-phase motors, with ventilated enclosures, CW (ELE) 6246; and the new range of fractional-horsepower motors including split-phase, poly-phase and d.c. machines. Other interesting exhibits will be three-phase, variable-speed motors and a full range of geared-motor units, to which one or two new developments have been made since last year.

RANSOMES, SIMS & JEFFERIES, LIMITED, Ipswich (*Stand B.*723/634), will show their new fork-lift truck, capable of raising loads of up to 3,000-lb. to a height of 14-ft. This truck follows very closely the design of the fork-lift "2000" model which appeared on the market 18 months ago. A large battery (480 amp.-hr. capacity) is fitted, ensuring that a full day's work can be carried out before re-charging becomes necessary. The control cabinet, forming the base of the driver's seat, is hinged to facilitate inspection. In addition, the company is showing a range of their other handling plant including fork-lift and platform trucks.

GEO. SALTER & COMPANY, LIMITED. West Bromwich (*Stand A.*407/306). Something in the nature of an "export exhibition" will form part of the display by this company. A section of the stand will house some of the firm's products used by Government departments overseas and by public and official bodies. Typical of these will be the No. 40 T.P.O. balance, as used in British Post Offices, coin checkers used in East African banks, and balances for Canadian and Indonesian railways.

BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION and the MIDLANDS ELECTRICITY BOARD (*Stand C.*408/509). Interesting examples of the use of electricity on this stand will include resistance, di-electric and induction heating as applied to industrial processes, vitreous enamelling, timber seasoning, die-casting and metal melting. Another section will be devoted to showing methods of heating factories electrically, by means of floor warming, off-peak block storage-heaters, and overhead infra-red heaters. Yet a further section will draw attention to the Midlands Board's research service to industry, with examples of case-histories to show how electricity has solved various problems.

SUFFOLK IRON FOUNDRY (1920), LIMITED, Stowmarket (*Stand D.*620). The chief item on this stand will be a display and demonstration of Stanelco automatic flame-brazing apparatus as related to Sifbronze uses. The company's technical representatives will be on the stand to explain the process and answer and advise on welding problems in general. As in former years, the company will be showing examples of the various fabricated articles, including castings, welded by using the firm's products and processes.

RAPID MAGNETIC MACHINES, LIMITED, Birmingham (*Stand C.*421), in addition to improved examples of their products, will be exhibiting a number of new units including a conveyor/elevator which automatically conveys articles magnetically. This is designed to move all types of ferrous objects including small castings, other metal parts, nuts, bolts, etc. Also exhibited for the first time is the company's new hopper magnet which, as its name implies, is for inclusion in hoppers, feed chutes, and sand systems, etc., for the extraction and removal of tramp iron. A 25-in. lifting electro-magnet will be demonstrated, handling castings scrap, etc., whilst in addition to its standard control gear, there will be the alternative type "Reguload" which has the advantage of providing current regulation.

FOUNDRY SERVICES, LIMITED, Birmingham (*Stand D.*165). This firm has sponsored the formation of a foundry section at this year's Fair, and is supported by manufacturers of furnaces and other accessories for the industry. An ambitious display has been attempted on Stand D.165 (occupying 1,500 sq. ft.) in the form of a working furnace from which to stage practical demonstrations of the firm's exothermic feeding compound in service, compared with refractory feeder heads. The intention is to tap high-tensile brass from a furnace into a handshank, later conveyed by monorail to ingot moulds, where the metal will be poured. This exhibit is designed especially to appeal to the steel maker, but it had to be taken into account that steel could not be used in the demonstration owing to the many practical difficulties—including the necessity of melting at very high temperatures within close range of spectators. The high-tensile brass has feeding and piping characteristics similar to steel. Other features of the stand will be devoted to a display of photographs and typical castings showing results achieved by the use of the firm's proprietary compounds. A coremaker will demonstrate the use of some of these for coremaking, jointing, and dressing.

Supplementary List

Equipment and supplies firms and others usually showing items of interest to foundrymen visitors are included in the following list and their stand numbers are quoted. (Unfortunately no details of their particular exhibits are available at the time of going to Press):—

Ashworth Ross & Company, Limited, Dewsbury (D.534).
Air Control Installations, Limited, Ruislip (D.165).
Aeraspray Associated, Limited, Birmingham (D.734).
Aerostyle, Limited, London (D.643).
Acheson Colloids, Limited, London (D.602).
Bakelite, Limited, London (C.505 and 404).
Beecham Buildings, Limited, Shipston-on-Stour (B.711 and 620).
B.I.F. Engineering Company (1940), Limited, Birmingham (D.712).
B.I.P. Tools, Limited (C.413/312).
Blending Machine Company, Limited, Birmingham (C.504).
Borax Consolidated, Limited, London (D.718).
British Aero Components, Limited, Warwick (C.413/312).
British Industrial Sand, Limited, Redhill (D.246).
British Iron & Steel Federation, London (D.409 and 308).

British Non-Ferrous Metals Federation, Birmingham (D.219).
Carr, Richard W. & Company, Limited, Sheffield (D.426).
Clarks Ironware, Limited, West Bromwich (A.520).
Copper Development Association, London (D.232).
Coventry Climax Engines, Limited, Coventry (Outdoor 1344).
Dargue Brothers, Limited, Halifax (D.132).
Delta Metal Company, Limited, Birmingham (D.313 and 210).
Denison, Saml. & Son, Limited, Leeds (D.517).
Dohm, Limited, London (C.613/512).
Dunlop Rubber Company, Limited, Manchester (D.623/522).
Dustraction, Limited, Leicester (D.619 and 518).
Electromagnets, Limited, Birmingham (C.605).
Felco Hoists, Limited, London (D.247 and 146).
Fellows Brothers, Limited, Cradley Heath (D.629).
Feslente, Limited, Surrey (D.246).
Fisher & Ludlow, Limited, Birmingham (D.641/540 and Outdoor 1318).
Foundry Mechanisations (Baillot), Limited, Bletchley (D.249/148).
Furnace Constructions Company, Limited, Birmingham (D.114).
Furnace Exchange, Newhaven (347).
Gough & Company (Hanley), Limited, Stoke-on-Trent (C.329 and 228).
Hale Enamellers, Limited, Tipton (B.619).
H.E.C. Compressors & Engines, Limited, Birmingham (D.739/638).
Herbert, Alfred, Limited, Coventry (D.314).
Hilger & Watts, Limited, London (D.314).
Imperial Chemical Industries, Limited, Birmingham (D.413 and 312).
Industrial Pyrometer Company, Limited, Birmingham (C.734).
I.T.D., Limited, Birmingham (D.641/540).
Lansing Bagnall, Limited, Basingstoke (C.727/628).
Lazarus, Leopold, Limited, Birmingham (D.257).
Lees, Hall & Sons, Limited, Newhaven (D.347) (see JOURNAL, April 18, p. 481).
Leytonstone Jig & Tool Company, Limited, London (C.413/312)
Lockers (Engineers), Limited, Warrington (D.511 and 408).
Locker, Thomas & Company, Limited, Warrington (D.511 and 408).
Matthews & Yates, Limited, Manchester (D.707).
McKechnie Brothers, Limited, Birmingham (D.500).
Mellor Mineral Mills, Limited, Stoke-on-Trent (C.613/512).
Midland Bolt, Nut and Rivet Company, Darlaston (D.628).
Modern Air Systems (Leicester), Limited (D.619 and 518).
Oakland Metal Company, Limited, Derby (A.327 and 226).
Rawlplug Company, Limited, London (C.725 and 626).
Rozalex, Limited, Manchester (D.706).
Shell-Mex and B.P. Limited, London (D.401 and 300).
Sklenar Furnaces, Limited, Cardiff (D.165).
Slingsby, H. C., Limited, London (B.419/324).
Transmission Accessories, Limited, Leighton Buzzard (D.311/208).
Turner Bros. (Birmingham), Limited, Birmingham (D.625 and 524).
Universal Conveyor Company, Limited, Leicester (D.619 and 518).
Wheway, Job & Son, Limited, Walsall (B.226).

It is hoped to include additional notes on other stands of major interest to readers in next week's issue of the JOURNAL.

Newton, Chambers' Developments Intensified

Extension and re-equipment of the works and production facilities of Newton, Chambers & Company, Limited, is to be intensified this year, states the chairman, Sir Peter Roberts, in the annual report for 1956. Both the engineering division's new development building and the excavator division's new paint and finishing shop have been completed and are now in use. The extensions to the constructional shop and the Izal factory are expected to be completed shortly.

These and other projects involved capital expenditure of over £500.000 during 1956, he states, and at December 31, the company was committed to further expenditure of £608,908. Other schemes have reached an advanced stage of planning and it is expected that at least a further £300,000 will be approved this year.

Fixed assets have increased by £376,710 to £1,535,411 and stocks and work by £405,574 to £2,770,340. The whole of this expansion has been financed out of retained profits and reserves. The net profit, before tax, increased from £746,594 to £753,349, and the ordinary dividend is maintained at 15 per cent.

Law Case

Founders Fined

Blakewater Foundry Limited, Blackburn, were fined £20 by Blackburn magistrates for failing to maintain the rope of a jib-crane, and £1 for overloading the crane beyond its safe working capacity, on April 17. A factories inspector, Mr. J. Rudd, stated that the derricking rope on a jib-crane, which collapsed at the foundry on January 11, killing two workmen, was found to be badly corroded. It had virtually disintegrated at one point and showed no recent sign of lubrication.

The men who died were acting as slingers in an operation which involved lifting a 35-cwt. iron casting from the ground to a lorry. Their job was to fasten the lifting hook on to slings around the casting and give orders to other men at the crane controls. When the casting had been lifted to the height of the lorry and just after the order to lower the jib had been given, the derricking rope snapped without warning.

The crane's safe working load was 30-cwt. It had been installed in 1947 in the foundry yard, but no record could be found of the derricking rope having been replaced since then. Details of the safe working load were marked on the crane in two different places. Mr. Rudd submitted that had the crane been inspected regularly the condition of the rope would have been observed by those carrying out the maintenance. It was not alleged that overloading was the cause of the accident, but it was felt that the condition of the rope was such that it could well have been broken by a sudden jolt when carrying a weight even below that of its safe-working load.

The company had arranged for the crane to be inspected periodically by an engineering surveyor for an insurance company. When it was inspected in July last year there was no adverse comment made on the rope. The surveyor had made another inspection two days before the accident of which no written report was available, but he understood no adverse comment was made verbally at the time.

Observing that the firm had a good reputation and no previous Factories' Act conviction, Mr. Rudd added that he felt that though they may not have been well served by this surveyor, they should have realized that the rope was at the end of its useful life and should have replaced it.

Pleading guilty to both summonses, Mr. J. A. Dunkerley, for the company, said they felt deep regret at the accident. It had not been realized that the casting—not of the usual type—was as heavy as it was. Legally the company were obliged to have the crane inspected once every 14 months, but they had given instructions for inspections every six months. No defects had been reported by the surveyor. Once every three or four months men had been engaged on overtime rates to lubricate the crane but part of the rope must have been missed.

GENERAL REFRACTORIES, LIMITED—Mr. W. G. Girling has retired from the board.

JOHN THOMPSON, LIMITED—Mr. Charles J. Howard and Mr. Christopher R. Thompson have been appointed directors.

WICKMAN, LIMITED—Mr. S. W. Perkins, special director and manager of the factored machine division, has been appointed to the board. Mr. J. W. Buchanan, who gave up his executive office in 1955 and has since served the company in a consultative capacity, has relinquished his appointment on reaching retirement age.

Equipment & Supplies

Protective Clothing

Exhibitions are one of the best venues for launching new designs of equipment and other manufactures, and the fifth Factory Equipment Exhibition currently being held at Earls Court, London, is no exception. The firm of R.F.D. Company, Limited, of Godalming, Surrey, have taken the opportunity to introduce two articles of protective clothing, of particular interest to founders, and these can be seen being modelled each day at the exhibition, together with other garments.

Lightweight Foundry Suit

Developed in conjunction with J. Stone & Company (Charlton), Limited, R.F.D. have introduced a lightweight foundry suit comprising a jacket and trousers made in tough flexible cotton duck, flameproofed by the proprietory "Proban" process. An important feature of the suit is the idea of locating leather and/or asbestos facings on areas most vunerable to molten-metal splash (Fig. 1), particular attention having been paid to the lower sections of the trousers. It is claimed that this foundry suit is much less cumbersome and considerably more flexible than conventional asbestos suits although the manufacturers do not claim that it provides quite the same protection as the all-asbestos type. Foundry managements, where the suits have been undergoing field trials, report that employees are at least willing to wear it and that a considerable measure of protection is afforded.

Air-barrier Mask

An air-barrier mask (Fig. 2), thought to be the first of its kind, also displayed at the exhibition by the R.F.D. Company, Limited, has been designed for protection of the respiratory system, eyes and ears against concentrations of vapour, fumes, dust and dirt, such as occur in some foundry processes. The mask relies on the setting up of an air barrier within the visor opening in the hood by means of a stream of air, under pressure, which is introduced into the mask. The equipment (Fig. 2) thus comprises a mask covering the head (with an aperture for vision, 5 by 3½-in.), filters, and an inlet valve which is coupled to a ¾-in. dia. PVC air hose. It is claimed that these masks can be successfully used in extreme conditions, *e.g.* where the dust or fumes are blown into the face; where work is carried out in confined spaces or where a vizor or goggles would become fouled quickly. The hoods of the masks are expendable. Operating air should be supplied at a pressure of 20-lb. per sq. in. and at a rate of between 5 and 10-cub. ft. per min. per operator.

Luggage Balance

An air-travellers' balance has been introduced by Geo. Salter & Company, Limited. The balance is designed so that air travellers can weigh their baggage at home or in their hotel before it is checked at the airport. It has dual marking up to 50-lb. by 1-lb. and 23-kg. by ½-kg., and will be shown for the first time at the British Industries Fair in Birmingham from May 6 to 17. The balance is finished in Air Mail blue with brass dial and is supplied in a polythene pouch, together with a chart showing permissible air luggage weights. There is no purchase tax, and the price is modest.

At the annual meeting in London last Tuesday of the British S.G. Iron Producers' Association, Mr. W. R. COOPER, a director of Lloyds (Burton), Limited, was elected president.

FIG. 1.—*Sulphur dusting being carried out on a magnesium-alloy melt in the foundry of J. Stone & Company (Charlton), Limited. The founder is wearing the new R.F.D. lightweight foundry suit.*

FIG. 2 (*left*).—*Frontal view of the air-barrier mask manufactured by R.F.D. Company, Limited, and* (*right*) *side view with the hood removed, showing frame, headpiece, filter and inlet-valve unit.*

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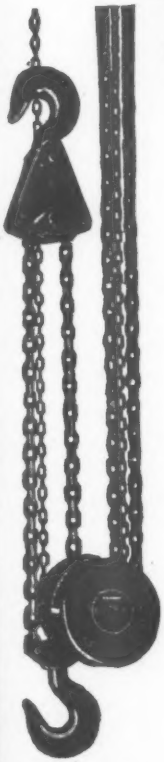

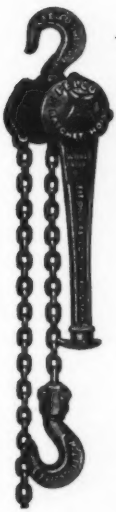

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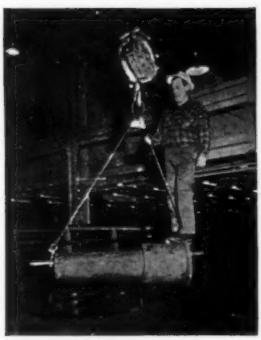

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News in Brief

LANCASHIRE DYNAMO NEVELIN, LIMITED, Hurst Green, Oxted, Surrey, announce that their telephone number is now Oxted 3361.

THE TRANSFORMER DEPARTMENT of the Metropolitan-Vickers Electrical Company, Limited, has been removed to Floats Road, Wythenshawe, Manchester, 23.

THE mechanical engineering laboratories of the Department of Scientific and Industrial Research at East Kilbride were inspected by Princess Margaret on Wednesday, April 24.

A CONTRACT, worth more than £50,000, for Timken tapered roller bearings for US Army vehicles in Japan, has been awarded to British Timken, Limited, Aston, near Birmingham.

"HOW GLUE STICKS" is the subject of a lecture to be given by N. A. de Bruyne, M.A., PH.D., F.INST.P., managing director of Aero Research, Limited, at the Royal Institution on May 31.

THE RIVER DON WORKS of the English Steel Corporation, Limited, Sheffield, were toured on Thursday, April 18, by a delegation from St. Germaine-en-Laye, France, who were visiting Doncaster.

BLACKBURN (DUMBARTON), LIMITED, which had to pay off more than 200 men a few weeks ago because of falling orders, has landed a contract in connection with atomic research from a London firm.

AVERAGE SELLING PRICES for the month of March of members of the Federation of Light Metal Smelters (calculated to the nearest 10s.) were:—LM1, £166 10s. per ton; LM2, £164; LM4, £187 10s.; LM6, £205.

EDGAR ALLEN & COMPANY, LIMITED, have recently presented to the Cutlers' Company of Sheffield, chandeliers which are claimed to be the largest to have been made in England for 40 years. They were first seen on the occasion of the Cutlers' feast on April 5.

LAST FRIDAY Sir Reginald Kerr, general manager of British Transport Waterways, announced at Birmingham that the British Transport Commission had approved a £959,000 programme of improvements for the River Severn and the Gloucester & Sharpness Canal.

Mr. CHARLES W. HAMPTON, chairman and managing director of C. & J. Hampton, Limited, Bernard Road and Record Tool Works, Sheffield, presented long service awards to 12 new members of the firm's "Thirty Club" at the Arcade Restaurant, Sheffield on Monday, April 15.

THE RECENT OPENING of the new licensed club at the North British Steel Foundry, Bathgate, was only the start of a comprehensive welfare scheme envisaged for this foundry. The company and the social welfare club plan to bring all employees and their families into the scheme and has lent the club a cinema projector; film shows for the children are planned.

DURING A SEVEN-DAY EDUCATIONAL TOUR of Sheffield and district as guests of the British Council, 25 foreign students, on April 15, visited the Thorncliffe Works of Newton Chambers & Company, Limited, and toured the works and the training school. In the evening they were addressed by Mr. C. F. Hurst, of Samuel Osborn & Company, Limited, on "People in Industry."

ADDRESSING the Town and Country Planning Association in London, Mr. Paul S. Cadbury called for the national control of industrial location as a means of solving the congestion of industrial areas. He said it was useless for industries to be asked to move to new development areas if the space made available by their removal was then filled up again by other industries.

OVER 120 employees with more than 40 years' service with N. Hingley & Sons, Limited, Netherton, were entertained to dinner by the management at Old Hill recently. Among the long-service employees were Mr. Thomas Clarke with 62 years and Mr. Alfred Hodgetts with 61 years. Mr. P. Jump, managing director said that the aggregate service of those present totalled 7,500 years.

MECHANICAL DESIGN and construction work for the £9,000,000 petrochemicals plant planned by the Esso Petroleum Company, Limited, at its Fawley refinery, is to be undertaken by Foster Wheeler, Limited, the company which built the refinery—the largest in the UK. The new plant is to process 250,000 tons a year of petroleum intermediates into raw materials for synthetic rubber and plastics.

UNEXPECTED ARRIVALS at the Lancashire factories of Leyland Motors Limited, last week, were a number of Spaniards who wished to visit the works where Madrid's buses are produced, before attending the Manchester United *v.* Real Madrid football match at Manchester. Among the travellers was Senor Poyan, managing director of Leyland Iberica S.A., who was a former centre-forward of the Spanish national youth team.

INCLUDED IN the 5,000 tons of British exports which the Canadian Pacific 25,500-ton liner Empress of England is carrying on her maiden voyage to Montreal is a large double-helical gear, cast and cut by the Jackson Division, Salford, of David Brown Industries, Limited, together with its mating pinion. The gear set is one of four ordered through David Brown (Canada), Limited, of Toronto, by a Quebec customer for driving ball-mill coal pulverizers.

AMONG THE MANY successful youth encouragement programmes for the foundry field are the apprentice contests sponsored by the American Foundrymen's Society. The latest competitions, which closed April 1, brought the greatest number of entries (583) since the annual contest was introduced—251 in the wooden-patternmaking division; 119, metal-pattern division; 122, iron moulding; 48, steel moulding; and 43 in the non-ferrous-moulding division.

ABOUT 600 PEOPLE attended a dinner at the Hadley works of Joseph Sankey & Sons, Limited, on April 26, when long service awards were presented to 284 employees. The 52 with 40 years or over received a clock or watch, the 71 with 30 years a silver badge and the 161 with 20 years a bronze badge. Since 1935 the firm has presented 1,199 similar awards. Presentations were made by the managing director, Mr. H. F. Hodgson. Mr. G. B. Sankey, director and general manager, also paid tribute to employees.

A CHEQUE for $1,000,000 (£335,000), the initial payment in a £1,000,000 contract negotiated last year by G. & J. Weir, Limited, Glasgow, was handed over in the city recently. His Excellency Lt.-Governor Michel Gersira, of Curaçao, Netherlands Antilles, visiting the firm's works, signed the formal contract for Weir sea-water evaporating plant to be supplied to the island, and handed over the cheque. The contract is for boilers and electrical evaporators to produce 4,000 tons of fresh water daily for Curaçao.

(Continued on page 558)

SUPINOL CORE OILS

SATISFY THE MOST EXACTING REQUIREMENTS IN

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and
PRICE!

Free Technical Service

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FACTORY: CONCORDIA WORKS, LONDON, E.14.

News in Brief

(*Continued from page 556*)

IF THE BRITISH AND FRENCH GOVERNMENTS grant the necessary co-operation, preliminary studies are to be made of the technical and economic aspects of linking England and France by tunnel. The cost of such a project would be £100,000,000. Frenchman, Comte Arnaud de Vitry, and American, Mr. Frank P. Davidson, have formed a company in New York, Technical Studies Inc., with the object of prosecuting the design. Recently their agents have been negotiating the formation of parallel companies in London and Paris.

THE SIXTH FACTORY in Paisley to close down in as many months is the Ministry of Supply steelmaking works at Linwood Road, managed by Wm. Beardmore & Company Limited, News of the closure was made known on April 25 and it is expected that production will end in three months' time with the loss of employment for about 150 people. It is believed that the closure is due to a change in the defence programme. The question of finding other work for the displaced personnel is being taken up with the Ministry of Labour.

A CONTRACT for five 100-ton cranes and one 50-ton crane—estimated to cost more than £1,250,000—has been placed with Butters Bros. & Company, Limited, Glasgow. The cranes are part of the reorganization and modernization scheme of the shipyard of Cammell Laird & Company, Limited, Birkenhead. Delivery is to start at the end of 1958 and will be completed by the end of 1961. The cranes are monotower cranes of the luffing-jib type, and are not only the largest yet supplied by the Glasgow firm but are also the heaviest of their type ever to be built in this country.

WORK has begun on site preparation for a £1,200,000 extension scheme to increase the productive capacity of the new South Works of the Power-Gas Corporation, Limited, Stockton-on-Tees. This company, principally engaged in the design and manufacture of plant for the iron-and-steel, chemical, gas, petroleum, and edible-oil industries, recently reported orders in hand to the total value of £12,000,000. Expenditure amounts to £2,000,000 on earlier phases of the development plan, and it is now intended to erect a 410-ft. long machine shop, a 100-ft. extension of the heavy-machine shop, and the construction of a medium machine bay with a 100-ft. span.

THE DEVELOPMENT and uses of social security statistics and the measurement of under-employment are two of the items being considered by the ninth International Conference of Labour Statisticians which opened in Geneva on April 24. The Conference is also considering the General Report on Labour Statistics, the final draft of the International Standard Classification of Occupations, and International Classification according to status. The United Kingdom Government is represented by Mr. R. F. Fowler, C.B.E., director of statistics, Ministry of Labour and National Service, who has as his adviser Mr. W. J. Littlewood, principal, General Register Office.

TUBE INVESTMENTS, LIMITED, announce the formation of a new subsidiary company, Old Park Engineering, Limited, of Dudley, Worcestershire, to take over general welded fabrications and structural work previously carried out at Round Oak Steel Works, Limited. The new company, for which a new 80,000-sq. ft. factory is now being equipped, will specialize in the production of fabrications up to 40 tons in weight for: mining equipment; bedplates of all types; mill gearboxes; furnace steelwork (including melting furnaces, soaking pits, etc.); furnace charging buckets; coke-oven machinery; turbine and heavy electrical machinery; and railway accessories.

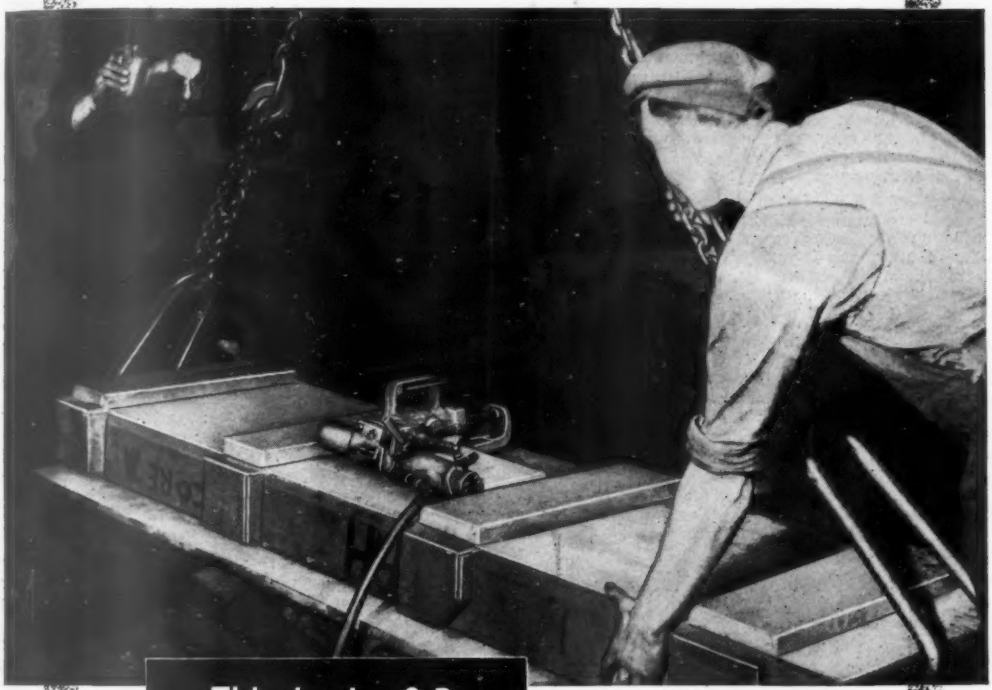
FOLLOWING A MEETING of the Midland Regional Board for Industry on April 16, the Regional Controller, Mr. J. W. Eldridge, said that a substantial drop in the number of unemployed and of short-time workers in the Midlands was expected for April. The number of workers registered as unemployed dropped by another 2,000 in March reducing the total to 24,000. The number of vacancies in the region had increased for the first time for nearly two years rising from 17,918 in February to 19,201 in March. Mr. Michael Halls, Regional Controller, Board of Trade, said that in the first three months of this year approval had been given for 94 industrial building projects in the region. These projects would provide premises occupying 2 to 3 million sq. ft.

TWO 18TH-CENTURY CANNONS have been sent to the Technical Stores Depot at Donnington, Shropshire, for display in the foyer of the officers' mess there. The larger of the two, believed to have been cast by Peter Verbruggen, Master Founder at the Royal Gun Foundry at Woolwich in 1785, bears the arms of King Christian VII of Denmark; the Royal Arms of George II; and the arms of Charles, third Duke of Richmond, Master General of the Ordnance. The cannon was cast as a gift for the King of Denmark who married Princess Matilda sister of George III. The smaller cannon was cast in 1797, and the royal cipher bears the initials of Charles, Marquess of Cornwallis. The cannons have been sent to Salop as a link with the old Woolwich Arsenal which Donnington replaced.

BIRMID INDUSTRIES, LIMITED, have announced the proposed acquisition of a further 30 acres to the site of their new Australian factory which is now nearing completion at Geelong, Victoria. The factory will make cylinder blocks and high-grade castings in iron- and aluminium-alloys for the Australian car and other light industries. The installation of the iron and aluminium foundries of this £A2,000,000 plant has been completed. Specialists from the Birmid group are being sent out to Australia to train some of the labour force locally recruited. At the same time some technicians from Australia are undergoing training at the Smethwick headquarters of Birmid; they will return to fill executive posts at the Geelong works. The title of the Australian branch will be Birmid Auto Castings Pty., Limited.

Sir BERNARD DOCKER, chairman of the Birmingham Railway Carriage & Wagon Company, Limited, presiding at the annual meeting of the company in Birmingham, on April 25, said that the supply of steel continued to be unsatisfactory; were a better supply available the company could considerably increase its output and personnel. Unfortunately, he said, an improvement in the position was not in the foreseeable future and the company had been compelled to purchase steel abroad with consequent, costly freight charges and difficulties with specifications. He went on to say that although the present position in the engineering industry was fraught with all sorts of difficulties he was optimistic about the prospects for the future. The work on hand assured steady employment for some considerable time ahead but rising costs in a very competitive market necessitated the utmost efficiency and good husbandry by management.

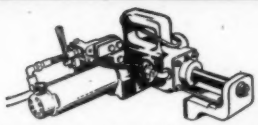
CONSOLIDATED PNEUMATIC MAKE OVER 480 DIFFERENT MODELS OF POWER TOOLS



This is the C.P. CORE BOX VIBRATOR

IT PAYS FOR ITSELF IN 30 DAYS

Consolidated Pneumatic



The CP Core Box Vibrator is the newest development in foundry equipment for core and pattern making departments. Cores weighing up to 3000 pounds are freed in less than 90 seconds. No more mallet work or sledging to loosen the core . . . just clamp the vibrator to the inverted box; its 9000 orbital vibrations per minute assure a perfect draw. Cores are free of flaws, damaged edges, distorted sections, dimensional variations . . . boxes remain in condition! Net weight of vibrator 34 lbs. Adjustable clamp jaw grip extends 3-7 inches. Write for the CP leaflet SP432.

CONSOLIDATED PNEUMATIC TOOL COMPANY LIMITED, 232, DAWES ROAD, LONDON, S.W.6

AIR COMPRESSORS : PNEUMATIC TOOLS : ELECTRIC TOOLS : CONTRACTORS EQUIPMENT : ROCK DRILLS : PUMPS : DIAMOND DRILLS

CP116

Personal

Mr. W. G. GIRLING has retired from the board of General Refractories, Limited.

Dr. J. N. ALDINGTON and Sir NICHOLAS CAYZER have been elected directors of Associated Electrical Industries, Limited.

It is announced that MR. D. S. RAMSAY C.A., has been appointed secretary of the North British Steel Foundry, Limited, Bathgate, and assumed his duties on April 22.

Sir GEORGE NELSON is to receive the honorary degree of Doctor of Laws at Manchester University on May 15. Sir George is chairman and managing director of the English Electric Company, Limited, in addition to being associated with many other companies.

Mr. OSWALD B. MILLER and Mr. KENNETH A. NOBLE have been appointed members of the Council of Industrial Design. Members appointed to the Scottish Committee of the Council of Industrial Design include Mr. DOUGLAS P. BLISS, Mr. PETER B. H. BROWN and Mr. T. J. CAVANAGH.

Mr. J. E. RICHARDSON, O.B.E., at present deputy general manager and engineering manager, Barrow Works of Vickers-Armstrongs (Engineers), Limited, was appointed a director of Canadian Vickers, Limited, on March 26. On May 1 he will assume the office of managing director of that company.

Mr. A. S. H. SAWERS, general manager of The Aluminium Castings Company, Limited, Ingleston Foundry, Greenock, who is also a director of Trent Foundries, Limited, Stoke-on-Trent, Staffs, has been appointed president of the Scottish branch and a member of the General Council of the Institute of British Foundrymen.

Sir HUGH BEAVER, one of three new members of the Council of the Institute of Directors, is a director of Richard Thomas & Baldwins, Limited, managing director of Arthur Guinness Son & Company, Limited, and a director of other companies. He was recently elected president of the Federation of British Industries.

Minister of State in the Board of Trade in Sir Anthony Eden's administration, Mr. AUSTIN R. W. LOW, M.P. for Blackpool North, has joined the board of Dorman Long & Company, Limited. He is already a director of John Brown & Company, Limited, the General Electric Company, Limited, and Dowsett Holdings, Limited, and other companies.

Mr. HENRY S. SHORT, who resigned from the chairmanship of Short Bros., Limited, shipbuilders, of Sunderland, two years ago, has decided on medical advice to give up his seat on the board of directors. He has been associated with the firm for 37 years, becoming chairman nine years ago. He was succeeded as chairman by his nephew, Mr. JOHN H. SHORT.

At the Harrogate conference of the Institute of British Foundrymen to be held in June, Mr. J. J. SHEEHAN, B.SC., A.R.C.SC.I., is to receive the E. J. Fox medal and Mr. T. R. Twigger the Oliver Stubbs medal. Mr. Sheehan is managing director of the Coneygre Foundry, Limited, and Mr. Twigger, chief research engineer and metallurgist of the British Piston Ring Company, Limited, Coventry.

The following changes in the Aluminium, Limited, organization have been announced: Mr. FRASER W. BRUCE, managing director of Northern Aluminium Company, Limited, succeeds Mr. R. E. Powell as president of Aluminium Company of Canada, Limited; Mr. M. P. WEIGEL, Montreal, becomes director of operations of Aluminium, Limited; Mr. R. E. POWELL, Montreal, who has been re-elected a director of both Aluminium, Limited, and Aluminium Company of Canada, Limited, will remain active in the management as a senior vice-president of Aluminium, Limited; Field-Marshal EARL ALEXANDER OF TUNIS, K.G., a director of Aluminium, Limited, has been additionally elected a director and chairman of Northern Aluminium Company, Limited, and Mr. S. E. CLOTWORTHY, at present sales director, has been appointed managing director of Northern Aluminium Company, Limited, succeeding Mr. Bruce who returns to Canada.

Mr. RICHARD WECK, PH.D., has been appointed director of research of the British Welding Research Association as from June 17. Before coming to England in 1938, Dr. Weck took an honours degree in civil engineering at the University of Prague in 1936. In 1943, he was appointed to the staff of the Welding Research Council and acted as editor of the Institute of Welding handbook on structural steelwork. He gained his PH.D. degree for work for the Admiralty on problems of residual stresses on ships' structures while on the staff of Professor Baker at the University of Cambridge Engineering Department. In 1951 he was appointed lecturer of the Department and was charged with the task of planning a post-graduate course for engineers. Dr. Weck, who is most widely known for his work on the fatigue properties of welded joints, is also a member of the BSI committees on girder bridges and notch-ductile steel; chairman of the Commission of the International Institute of Welding and a member of the Commission on fatigue.

Obituary

Mr. FRANK JONES, deputy company plant engineer with Babcock & Wilcox, Limited, at Renfrew, died on April 22.

Mr. R. D. FORBES, late managing director of Robert Melvin, Limited, ironfounders, Sunnyside Foundry, Alloa, Scotland, died on April 16.

Mr. EDGAR LLEWELLYN MORCOM, who was vice chairman of Belliss & Morcom, Limited, the Birmingham engineers, until July, 1954, when he also retired from the board, died on April 23. He was 76.

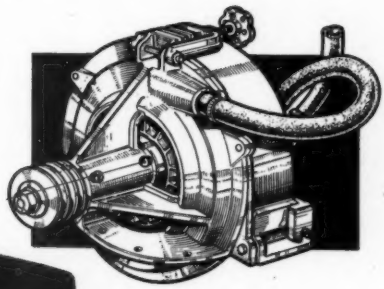
The death is announced of Mr. FRANCIS G. MACALPINE, director, since 1938, of H. W. Kearns & Company, Limited, machinery manufacturers, of Broadheath (Ches). Mr. Macalpine, who was 62, was also chairman of the Accrington Brick & Tile Company, Limited, and and director of Lancashire Tar Distillers, Limited.

Mr. ALFRED GERMAN ROSE, controlling director of Rose Bros. (Gainsborough), Limited, engineers, has died aged 55. Mr. Rose was a pioneer in many fields of wrapping and packaging, and recently developed ice-cream handling plant. Mr. J. A. FITCHETT, senior director of the firm, who was associated with the late Mr. William Rose in the development of the early machines, has also died at the age of 77.

Mr. GEORGE RAWLING, a director of Robert Hudson, Limited, light railway equipment manufacturers, etc., of Leeds, died on Good Friday. He joined the company in 1916 and, from 1920, spent four years in South Africa with the company's associated organization. He joined the home sales department on his return to Leeds, subsequently succeeding the late Mr. Percy Hudson as home sales director. Mr. Rawling joined the board in 1943.

Shot Blast Equipment

This A-S-L Turbine is the most modern Shot Blasting Unit available. The bi-phase air injection system enables shot to be projected at greater speeds using lower power with fewer replacements. The economies effected in spare parts alone are very substantial.



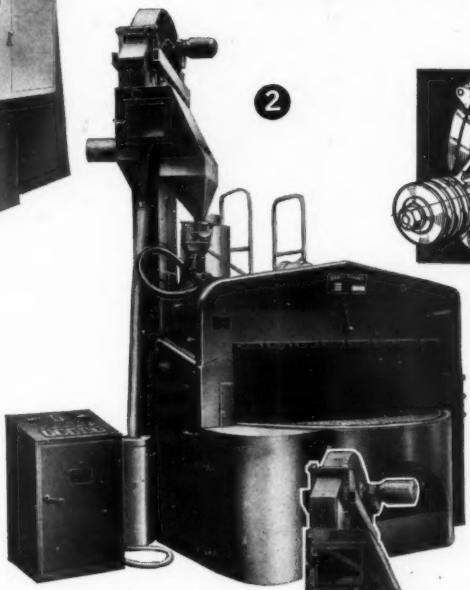
Baker Perkins High Speed Bi-Phase A-S-L Turbine, British Patent, No. 510681.

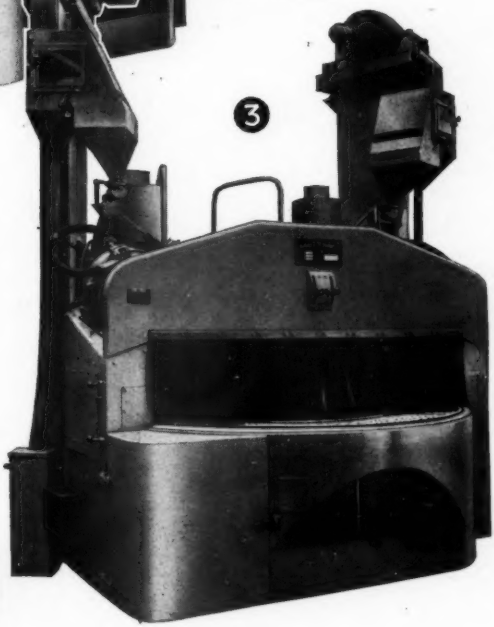
These machines do not require pits or special foundations.

1 **ROTARY BARREL**

2 **CADET**

3 **MEDIUM**





Our standard range of Rotating Barrel and Table Shot Blast Machines is capable of handling a wide range of Foundry products. Both types are semi-automatic, the rotating barrels being equipped with skip hoist loading gear and frontal discharge mechanism. These modern highly efficient machines are in use in Foundries all over the world, and are built to the high standards of design, materials and workmanship characteristic of all Baker Perkins' machines.

BAKER PERKINS LIMITED
ENGINEERS
WESTWOOD WORKS · PETERBOROUGH

Raw Material Markets

Iron and Steel

The foundries restarted work after the Easter holiday with a fair amount of work on hand, though productive capacity at most establishments is not engaged to its full extent. Present demand for high-duty castings for many trades keeps the engineering and speciality foundries employed on a better scale than other units. Their outputs, however, are on a much lower scale than they were some months ago, chiefly due to the recession in the motor vehicle trade and, to a lesser extent, in the call for castings from other trades, including machine tool and agricultural implement makers. The slight improvement in the demand for castings from the motor-car trade continues, but business has not, so far, improved to the extent which was expected. Many of the foundries which cater mainly for that trade are still short of work, although there are prospects of increased business when stocks have been reduced. Good tonnages of castings continue to be sent to machine-tool makers, the general engineering trades, power and electrical plant manufacturers, and others.

The light foundries continue to be only moderately employed and little, if anything, can be foreseen in the near future to improve their prospects. The domestic equipment trade is still hampered by economic restrictions, while the call for builders' castings is much below normal for the period of the year, apart from gutters and pipes, which are in better demand. The jobbing foundries are fairly busy, but the textile foundries are in need of more work.

Raw materials are sufficient for consumption requirements and also to augment stocks, although, generally, the foundries do not carry appreciable stocks and appear content to indent only for the tonnages which are required for the work on hand. All grades of pig-iron are available in more than sufficient quantities to meet present demands and most of the producers are compelled to place supplies into stock. Low-phosphorus irons and hematite are being taken up in good quantities, but pressure for supplies is not heavy and the furnaces are able to cover requirements without difficulty.

Refined irons are also plentiful. High-phosphorus irons are ample and producers are not receiving sufficient orders to absorb current outputs, which are on a much lower scale than normally. Apart from hematite pig-iron, which is not being exported, consignments of other grades are available for shipment, and many makers would be glad to avail themselves of that market if licences could be obtained.

Although demands from the re-rollers for small bars, light sections, and strip are not so heavy as they were, fairly good outputs are being obtained with the orders on hand, which include some export business. Stockists are not now specifying the same tonnages as before, particularly in some sizes for which they hold good supplies, and there is some falling off in demands from home consumers. Reinforcing rods are in heavy demand, and some improvement in business for strip is being received from the automobile trades.

Supplies of steel semis from home steelworks maintain their improved level and these are being augmented with occasional consignments from overseas. The re-rollers, however, now have smaller stocks, particularly in some sizes and grades, and are having to rely mainly on supplies from home sources to make good the shortages—mainly in the smaller sized billets and carbon and special quality steels.

Non-ferrous Metals

For some months the price of zinc on both sides of the Atlantic has been almost entirely dependent on stockpiling activities either directly through US Government buying or through its agencies effecting barter transactions. During 1956 it is estimated that the US Government stockpiled as much as 250,000 tons of zinc and the rate of off-take at present is even higher, for in March the US Government absorbed 25,608 tons. How much longer this situation can last has been a burning question for a long time. Now an indication of the likely answer has been given by Mr. Felix E. Wormser, Assistant Secretary of the Interior, who has intimated that US Government stockpiling for defence purposes may cease in a matter of months. This announcement followed the closing down of Eagle-Pitcher, a leading US zinc producer, on all zinc-mining and smelting operations in Missouri, Oklahoma, and Kansas, which form the well-known Tri-State Area. Concern was expressed at the high level of imports, totalling 51,789 tons, in the first two months of this year, which compares with US domestic output during the same period of 94,300 tons. US producers are also disturbed by the high level of world production, which is reported to be running at nearly double the rate of output in 1946. If the US stockpiling programme does definitely end several more US mines will have to close down. Thus pressure can be expected to develop on the US Government to afford protection by the introduction of higher tariffs. This sobering outlook put the zinc price in London much easier, although the US price remains at 13½ cents per pound, East St. Louis.

Copper remains a quiet market both in London and in New York with business on the Continent reported as being of a routine nature. However, there is the rumour that the West German Government intends to create a stockpile of around 200,000 tons. So far this can only be classed as rumour. In the US prices are a shade lower, with custom smelters offering the red metal around 31 cents, export copper is quoted at 30 cents, and scrap is wavering around 25 cents per pound. Primary producers are still holding their price at 32 cents per pound.

Lead is dull in London and inactive in New York. Prices, nevertheless, are steady in both centres. Tin is a fairly active market on both sides of the Atlantic.

Forthcoming Events

MAY 6 to 10

Engineered Castings Show

Exhibition of American castings, sponsored by the American Foundrymen's Society, to be held in Cincinnati, USA.

MAY 7

Society of Chemical Industry

Corrosion group:—Annual general meeting followed by "A Pilgrim's Progress from Corrosion," by T. Henry Turner, M.SC., at 14, Belgrave Square, London, S.W.1.

MAY 8

National Society of Master Patternmakers

Annual general meeting at Grand Hotel, Manchester, 11.45 a.m.

MAY 9

Institute of British Foundrymen

Tees-side branch:—Works visit to Head Wrightson Steel Foundries, Limited, Thornaby-on-Tees.

MAY 11

Institute of British Foundrymen

Stoke-on-Trent section:—Annual general meeting, election of officers, etc., 7 p.m., in the Grand Hotel, Hanley.

TWW service to the Foundry Trade

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SIEVES & RIDDLES

FOUNDRY & INDUSTRIAL BRUSHES

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FS35

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

May 1, 1957

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £20 1s. 0d.; Birmingham, £19 13s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £21 18s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £22 2s. 3d.

Scotch Iron.—No. 3 foundry, £23 4s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £24 6s. 6d.; South Zone, £24 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £25 14s. 0d.; South Zone, £25 16s. 6d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £22 17s. 6d.; Scotland (Scotch iron), Zone S. 1, £23 4s. 0d.; Sheffield, £24 4s. 6d.; Birmingham, £24 12s. 0d.; Wales (Welsh iron), £22 17s. 6d.

Basic Pig-iron.—£19 3s. 0d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £50 0s. 0d. to £53 5s. 0d., scale 17s. 0d. to 17s. 6d. per unit; 75 per cent. Si, £70 0s. 0d. to £76 7s. 6d., scale 17s. 0d. to 17s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 28s. 6d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 12s. 3d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £250 0s. 0d.; 38/40 per cent., £299 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 2d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 2d. per lb. of W.

Ferro-chrome (6-10 ton lots).—4/6 per cent. C, £96 0s.0d. to £99 10s. 0d., basis 60 per cent. Cr, scale 33s. 0d. per unit; over 6 per cent. C, £94 0s. 0d., basis 60 per cent. Cr, scale 31s. 0d. to 33s. 0d. per unit; 2 per cent. C,* 2s. 2d. per lb. Cr.; 1 per cent. C,* 2s. 2½d. per lb. Cr; 0.15 per cent. C,* 2s. 3d. to 2s. 3½d. per lb. Cr; 0.10 per cent. C,* 2s. 3½d. to 2s. 3¾d. per lb. Cr; 0.06 per cent. C,* 2s. 3¾d. to 2s. 4d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 0d. to 7s. 6d. per lb.

Metallic Manganese.—90/92 per cent., carbon-free, £290 0s. 0d.; 96/98 per cent., £310 0s. 0d.

Ferro-columbium.—65/75 per cent. Nb + Ta, 22s. 0d. to 23s. 0d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £82 12s. 6d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £30 9s. 0d.; tested, 0.08 to 0.25 per cent. C, £31 9s. 0d.; hard (0.41 to 0.60 per cent. C), £32 10s. 6d.; silico-manganese, £41 0s. 0d.; free-cutting, £34 13s. 0d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £38 4s. 6d.; silico-manganese, £41 7s. 6d.

* Average 68-70 per cent.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £36 3s. 6d.; basic, hard, over 0.41 up to 0.60 per cent. C, £37 6s. 0d.; acid, up to 0.25 per cent. C, £40 7s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £39 2s. 0d.; boiler plates (N.-E. Coast), £41 12s. 0d.; floor plates (N.-E. Coast), £40 11s. 0d.; sectional material, N.-E. Coast, £37 11s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested (4-ton lots), £37 18s. 0d.; flats, 5 in. wide and under (4-ton lots), £37 18s. 0d.; hoop and strip, £37 17s. 6d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £41 6s. 0d.; black sheets (hand mill), 17/20 g., £52 4s. 6d.; galvanized corrugated sheets, 24 g., £65 9s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £65 10s. 3d.; nickel-chrome, £92 13s. 0d.; nickel-chrome-molybdenum, £104 11s. 6d.

NON-FERROUS METALS

Copper.—Cash, £240 5s. 0d. to £240 10s. 0d.; three months, £241 0s. 0d. to £241 5s. 0d.; settlement, £240 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3⅞d. per lb.; rods, 271s. 3d. per cwt. basis; 20 s.w.g., 304s. 6d. per cwt.

Tin.—Cash, £769 10s. 0d. to £770 0s. 0d.; three months, £769 10s. 0d. to £770 0s. 0d.; settlement, £770 0s. 0d.

Lead (Refined Pig).—First half May, £109 0s. 0d. to £109 5s. 0d.; first half August, £109 0s. 0d. to £109 5s. 0d.

Zinc.—First half May, £94 5s. 0d. to £94 10s. 0d.; first half August, £91 0s. 0d. to £91 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £128 15s. 0d.; rolled zinc (boiler plates), all English destinations, £126 10s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £105.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 11½d. per lb.; rods, drawn, 2s. 11d.; sheets to 10 w.g., 206s. 6d. per cwt.; wire, 2s. 8½d.; rolled metal, 208s. 3d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £175; B6 (85/15), — ; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £223; HTB2 (38 tons), — ; HTB3 (48 tons), —.

Gunmetal.—BS1400, LG2 (85/5/5/5), £233; LG3 (86/7/5/2), £245; G1 (88/10/2/½), £300; (88/10/2/1), £291.

Phosphor Bronze.—BS1400, PB1 (AID released), £309 per ton.

Phosphor Bronze Strip, etc.—Strip, 291s. 0d. per cwt.; sheets to 10 w.g., 290s. 0d. per cwt.; wire, 4s. 0d. per lb.; rods, 3s. 4½d.; tubes, 3s. 4½d.; chill cast bars: solids 3s. 3½d., cored 3s. 4¾d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 2¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 1¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £86 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £197 0s. 0d.; aluminium bronze (BS1400), AB1, £266; AB2, £275.